



## ROYAL CANADIAN ARMY CADETS

### RED STAR

### INSTRUCTIONAL GUIDE



### SECTION 1

#### EO M224.01 – DESCRIBE IMMEDIATE ACTIONS TO TAKE WHEN LOST

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Total Time:

60 min

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#### PREPARATION

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##### PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-702/PG-001, 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

N/A.

##### APPROACH

An interactive lecture was chosen for TP1 to TP3 to present basic or background material.

An in-class activity was chosen for TP4 as it is an interactive way to reinforce the actions to take when lost, to provoke thought and to stimulate interest among cadets.

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#### INTRODUCTION

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##### REVIEW

N/A.

##### OBJECTIVES

By the end of this lesson the cadet shall be expected to describe the immediate actions to take when lost.

##### IMPORTANCE

It is important for cadets to have the ability to take action when lost as to increase their chances of survival.

**Teaching Point 1****Identify S.T.O.P. Principles**

Time: 10 min

Method: Interactive Lecture



Read to the cadets the *Cadence* article located at Annex A as the introduction to this TP. This article is intended to grab the cadets' attention and emphasize the importance of the actions to take when lost, highlighting the possibility that any cadet can get lost in the field.

It is important to note the cadet was found because of her training.



Once the article in Annex A has been read to the cadets, open the first part of the lesson by questioning the cadets on the following:

Q1. How did cadet Stephanie Leger become lost?

Q2. What action did she take upon accepting the fact that she was lost?

Answers the cadets provide will not be corrected, however they will be used as a means to get the cadets thinking about what they should do in such a situation. At the end of this TP the previous questions will be asked again to recognize any differences in answers.

Emphasize the importance of the S.T.O.P acronym as the first action to take upon recognition of becoming lost. Follow up this short story with a more detailed explanation of the S.T.O.P acronym with the information provided.

Getting lost can be as simple as leaving a hoochie to go to the latrine and becoming disoriented as experienced by cadet Stephanie Leger, or by following an incorrect compass course on a trek. Once it is determined that one is lost the best thing to do is to stay in one place, keep calm and try to gather information to determine one's location. The first 30 minutes of being lost is when people panic and tend to make the biggest mistakes. Following the acronym S.T.O.P. – Sit, Think, Observe, and Plan will help a lost cadet to think through the situation and make good decisions.

**S.T.O.P.**

**Sit.** Sit where you are! Do not panic. Many lost people waste valuable energy and risk injury by panicking – running aimlessly, continuing to travel after dark, or walking in circles. If a lost person decides to wander in an attempt to find their location, in most cases they will become more lost, increasing the distance between the known points of their course. This wandering will only increase the size of the search area, increasing the time it will take for a rescue team to locate an individual. As long as there is no immediate danger, stay in one place.

**Think.** Think about immediate and future dangers and the factors involved in the situation. Consider the time of day, personal physical condition, and the last time water or food was consumed. Try to list the options that are available to you.

**Observe.** Observe and listen for the signals of rescuers. Study the immediate environment, determining weather, terrain and resources available. Look around in the immediate area for a shelter location, fresh drinking water, and for clues of the current location.

**Plan.** Plan the best course of action – maybe it is close to dark and consideration should be given to setting up shelter, finding water or starting a fire. Include how to signal rescuers in the plan.



Once the S.T.O.P. acronym is understood, ask the following questions again in reference to the *Cadence* article in Annex A.

- Q1. How did cadet Stephanie Leger become lost?  
 Q2. What action did she take upon accepting the fact that she was lost?

The cadets should now have a better understanding of what cadet Leger went through and the actions she took. The anticipated answers are listed below.

- A1. She had wandered from her site and as a result of the approaching nightfall she was unable to find her campsite.  
 A2. When she realized she was lost, she followed the acronym S.T.O.P—Sit, Think, Observe, Plan.

Use their new answers and form a correlation between their previous answers. Emphasize again the importance of the S.T.O.P acronym as the first action to take when lost.

## CONFIRMATION OF TEACHING POINT 1

### QUESTIONS

- Q1. When a person is lost, when do the biggest mistakes generally occur?  
 Q2. What does the acronym S.T.O.P. mean?  
 Q3. What should one observe?

### ANTICIPATED ANSWERS

- A1. The biggest mistakes occur in the first 30 minutes of being lost.  
 A2. Sit, Think, Observe and Plan.  
 A3. When lost, a cadet should observe the immediate environment, weather, terrain and resources available. Look for a shelter location, fresh drinking water, and for clues of the current location.

## Teaching Point 2

## Discuss How to Control Fear and Panic When Lost

Time: 10 min

Method: Interactive Lecture



Many cadets will have fears of various things. Take the opportunity in this TP to bring to light some of the cadets' fears.

1. Open this TP by conveying to the cadets a personal fear (e.g. heights). This should open the door, encouraging the cadets to answer the following questions.
2. Question the cadets on what some of their fears are (fears can be of any type) and record them on flipchart paper/chalk board/whiteboard.
3. Categorize their fears in similar groups.

To feel fear is normal and necessary. It is nature's way of giving a person an extra shot of energy or adrenaline. Fear is a very normal reaction for people faced with an emergency which threatens their life.



Providing the information below discuss how the effects of fear and panic may affect a person.

## EFFECTS OF FEAR AND PANIC

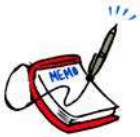
How individuals react to fear depends more on one's state of mind than on the situation. In any stressful, unplanned, or threatening situation, fear may overpower rational thinking and can ruin the chances of survival. Fear may also improve chances of survival. Since something can usually be done to improve any situation, accepting fear as a natural reaction to a stressful situation could lead to constructive behaviour and could increase one's chance of survival.



Providing the information below discuss how the sense of hopelessness contributes to fear.

## FACTORS THAT CONTRIBUTE TO FEAR

The feeling of helplessness and the sense of hopelessness are factors that contribute to the sense of fear. Fear must be recognized, accepted, and if possible, used to one's advantage by channelling the adrenaline towards the tasks at hand. The effects of fear can be battled by identifying each factor, understanding and coping with it.



Providing the information below discuss each category of fear and ask the cadets what are some ways they may personally see themselves dealing with and overcoming each fear.

## DEALING WITH FEAR

There are many common fears that arise when lost in the field. Addressing and understanding these fears may help one to survive for a prolonged period when lost. The list below explains how to deal with each fear.

**Fear of the Unknown.** What is out there? What is going to happen to me? Where is it safe? By accepting this fear as normal, one can remain calm and begin to answer each question. Do not criticize yourself for having critical or negative thoughts, just concentrate on and resolve each question or problem calmly and confidently.

**Fear of Personal Weakness.** This leads to a negative attitude and promotes behaviour to give up. Everyone can do something, no matter how bad the situation. Have confidence in the equipment that may be carried and one's skill to use it. Compare the current situation to similar situations learned about in the past to get through.

**Fear of Discomfort.** This causes people to continue into a bad storm in order to try to return to the security of a base camp where food and warmth are plenty, instead of stopping and making a safe, although uncomfortable, emergency shelter for the night before they are soaked, exhausted, hungry and hypothermic.

**Fear of Being Alone.** Even the independent can feel the effects of loneliness unless steps are taken to adapt to, and deal with the isolation. A strong imagination and sense of humour will help.

**Fear of the Dark or Animals.** People with phobias can easily imagine their worst nightmares coming true, especially in the stressful survival situation. Again, approach each fear with an action plan and an understanding of this fear in context with the whole situation.

**Fear of Suffering or Death.** This may be the strongest ally in survival. Keep the thought that one must act to survive. By accepting this possibility, and not dwelling on it, one can determine if their plans will provide them with security in their current situation. Have confidence in the rescuers abilities to locate a person.

## CONFIRMATION OF TEACHING POINT 2

### QUESTIONS

- Q1. How does fear affect a cadet when lost?
- Q2. What factors contribute to fear?
- Q3. How does the fear of discomfort affect cadets?

### ANTICIPATED ANSWERS

- A1. Fear can overpower rational thinking and could ruin the chances of survival. It may also improve them.
- A2. Helplessness and the sense of hopelessness contribute to fear.
- A3. This causes people to continue into a bad storm in order to try to return to the security of a base camp, instead of stopping and making a safe shelter to rest in.

## Teaching Point 3

## Identify the Five Elements of Survival

Time: 10 min

Method: Interactive Lecture



The instructor shall introduce this TP as the five elements of survival and relate the information to what the cadets will be trained on in further lessons (e.g. identify emergency shelters, lighting fires and cooking food).

## FIVE ELEMENTS OF SURVIVAL

After successfully completing the S.T.O.P. action and recognizing a survival situation, the lost individual shall take inventory of all the food and equipment on hand and proceed to implement the five elements of survival. These are listed in order of priority.

1. **Attitude.** Maintaining a positive attitude is essential. One can survive by staying calm, using all available resources, and prioritizing personal needs.
2. **Shelter.** A shelter is designed to provide protection from the weather and, depending on the conditions, protect a person from either hot or cold temperatures. Hypothermia and hyperthermia are two of the greatest dangers in a survival situation. A proper shelter can help prevent these from occurring. In a desert scenario, for example, the goal is to stay under a shelter, shaded from the effects of the sun. In cold weather situations, the shelter will provide insulation.
3. **Water.** Water is the most essential nutrient for the human body. Even when thirst is not extreme it can dull your mind. Lack of water will slowly degrade the ability to survive. With adequate shelter and water you can survive for weeks.
4. **Fire.** In a survival situation, fire provides heat and light, and signals to rescuers. Cold weather not only lowers the ability to think, but it also lowers one's will to do anything. Even a few degrees drop in body temperature can affect the ability to make reasonable decisions.

5. **Food.** Individuals in good physical condition can go for many days or even weeks without food. Your goal in a wilderness survival situation is to be located in the shortest time possible, so in most cases you will be located long before food becomes a survival issue. However it is always important to prepare for the worst and find ways to supply the body with substance, through berries, fish, animals, birds, etc.

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### CONFIRMATION OF TEACHING POINT 3

#### QUESTIONS

- Q1. What are the five elements of survival?
- Q2. What is the one essential nutrient the body requires to function?
- Q3. What does a shelter provide?

#### ANTICIPATED ANSWERS

- A1. Attitude, shelter, water, fire and food.
- A2. Water.
- A3. Shelter provides protection from the weather and, depending on the conditions, protects you from either hot or cold temperatures.

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### Teaching Point 4

### Develop a Plan

Time: 20 min

Method: In-Class Activity

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## ACTIVITY

### OBJECTIVE

The objective of this activity is to have the cadets apply the actions to take when lost to a given scenario.

### RESOURCES

- Pen and/or pencils (one per cadet);
- Flip chart marker (one per group); and
- Flip chart paper (one sheet per group).

### ACTIVITY LAYOUT

Groups shall be placed apart discouraging distraction between groups.

### ACTIVITY INSTRUCTIONS

1. Divide the cadets into groups of no more than four.
2. Give each group a marker and a piece of flipchart paper.
3. Present a scenario or assign a different one to each group and allow the cadets 10 minutes to employ the S.T.O.P. acronym to a scenario provided.

4. Allow each group two minutes to present their plan to the other groups.
5. After the groups have finished presenting the instructor will provide feedback on the scenario. Feedback should summarize that attempting each path could cause a cadet to get more lost. Applying the S.T.O.P. actions will increase the chances that the cadet is found in a timely manner.

### **Lost Cadet (Scenario A)**

Your cadet unit is participating in a weekend bivouac FTX where trekking a distance is involved. During the final leg of the trek, your shoelaces become undone and you stop to tie them as the group proceeds around a bend in the path. You are taking much longer than usual. Assuming the group continued on the same path, you take your time enjoying being by yourself on the path. As you round the corner the path opens into a small clearing that splits into four different routes. Concerned you will get into trouble by leaving the group you decide to try one of the routes and speed to catch up.

While travelling down the path you begin to realize this is probably not the correct route. The trek began during the late afternoon and you can see the sun is now getting low in the sky. You have travelled quickly on this path for a short period of time, when you realize you have taken the wrong path. You reassess your location and figure you must have made a mistake at the clearing. You head back on the path to the clearing hoping someone returned for you. Upon reaching the clearing no one is waiting for you. It is close to dark and there are three paths, one of which leads to the bivouac site.

You are lost, what should you do?

### **Lost Cadet (Scenario B)**

Your cadet unit's Silver and Gold Star cadets have just finished an extensive three-day trek. The trek covered over 30 km and now everyone is resting at the rendezvous point for the arrival of the bus to transport all cadets back to the home unit. It is mid-afternoon and many cadets are relaxing, resting their sore, exhausted bodies. The cadet WO is tasked to maintain a watch on all cadets and set boundaries inside which the cadets must remain.

When the bus arrives many of the cadets are eager to load the equipment and board the bus in anticipation of going home. After the bus is loaded, the cadet WO makes a quick count confirming all cadets are on the bus.

When the cadets were told they could go and rest while awaiting the arrival of the bus, you decided to go for a quick nap. Proceeding to the edge of a clearing, you found some shrubs that you rested your pack against. Using it as a back rest, you quickly dozed off. As time passed you awoke from your nap and proceeded to the waiting area. Moving from the shrubs back to the clearing, you are shocked to find no one there.

The shock of being left alone is a scary thought. Your initial instinct was to walk out; however, you have no idea where you are and you are not familiar with the route the bus took. You were dropped off 30 km away and trekked here totalling three days travel.

What should you do?

### **Lost Cadet (Scenario C)**

It is early September and your cadet unit has begun training for the orienteering competition that takes place in late October. You are new to orienteering, however after participating in a few orienteering events during summer training and a few previous practices with your cadet unit, you feel comfortable with your map-reading skills.

The orienteering coach recognizes your developing skill and decides to advance you to the intermediate training level for this practice. As you set out on the course, you realize that this will be more difficult than your previous orienteering practices. Travelling routes you have chosen, you find that the markers are placed in more difficult locations and the terrain the route crosses is more difficult to judge.

Enroute to your fourth control point you exit from a path and are faced with crossing a small river, the path looks to continue on the other side. The river appears to be rather deep. You decide to travel down the edge to find a shallow place to cross. After crossing you try to locate the path you saw to continue on course. You pace the side of the river for some time before finding the path you believed to be the correct route.

Continuing on course, you get the feeling you have travelled too far, however, you continue to move farther ahead. After a period of time you realize this is not the area you should be in at all—you must have taken the wrong path back by the river. The vegetation has changed and does not match what you see on the map. Stopping and inspecting the surrounding area you realize you have no idea where you are or where you have travelled. You are lost.

What should you do?

**SAFETY**

N/A.

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**END OF LESSON CONFIRMATION**

The cadets' participation in the activity in TP4 will serve as the confirmation of this lesson.

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**CONCLUSION**

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**HOMEWORK/READING/PRACTICE**

N/A.

**METHOD OF EVALUATION**

N/A.

**CLOSING STATEMENT**

Having an understanding of the immediate actions to take when lost and implementing them will help cadets increase their survival chances.

**INSTRUCTOR NOTES/REMARKS**

N/A.

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**REFERENCES**

C2-004 (ISBN 1-896713-00-9) Tawrell, P. (1996). *Camping and Wilderness Survival: The Ultimate Outdoors Book*. Green Valley, ON: Paul Tawrell.

C2-016 (ISBN 0-517-88783-5) Curtis, R. (1998). *The Backpacker's Field Manual: A Comprehensive Guide to Mastering Backcountry Skills*. New York, NY: Three Rivers Press.



CADENCE ARTICLE

Cadence • Issue 4 • Winter • 2001

# Forum

New ideas, best practices  
and lessons learned



Sgt Stephanie Leger learned more than she bargained for on her survival instructor's course.

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HOWEVER,  
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CLOTHING.

## LOST AND FOUND

By Capt Jon MacDonald

Sgt Stephanie Leger learned a lot more than she expected on her six-week survival instructor's course at the air cadet summer training centre in Greenwood, NS, this past summer. So did the cadet movement.

The fourth-year air cadet from 101 Royal Canadian Air Cadet Squadron in Moncton, NB was lost for 23 hours on her solo exercise in Cloud Lake, NS. But her story had a happy ending. And lessons were learned.

On the day of her solo exercise, Cadet Leger had not returned to her campsite by the end of the day. After searching for a few hours, staff notified the authorities and later, her parents. It was a call that any parent would dread. The Leger's 16-year-old daughter had been missing for 14 hours.

Cadet Leger's mother, Bernice, immediately flew to Greenwood. The training centre had organized a van and driver, accommodations, and a padre. Mrs. Leger was briefed on the situation and, at her request, was brought to Cloud Lake where the search was in progress. She was impressed to see some 200 people involved with the search efforts including personnel from the training centre, the RCMP, 14 Wing Greenwood, the Emergency Measures Organization and ground search and rescue teams from across the province. There were helicopters from 14 Wing and the Department of Natural Resources, as well as several tracking dogs.

It was late afternoon when Cadet Leger was found in good spirits and physical condition. She told the searchers that she had strayed from her site and was unable to relocate it, partly because it was getting dark. When she realized she was lost, she stayed where she was until she was found. Following a happy and tearful reunion with her mother, waiting paramedics checked her medical status, verified later at the local hospital.

The incident resulted in some valuable lessons. Cadet Leger said afterwards that she had seen the helicopters; however, she felt they could not see her because she was dressed in combat clothing. Little consideration had been given to the fact that combat clothing is designed to keep someone hidden in the bush. Given that



Cadet Leger embraces her mother after her ordeal.

combat clothing is practical for the course, Sgt Leger suggested that cadets carry something reflective or brightly coloured for potential emergency situations.

Searchers found Cadet Leger because she used the safety whistle she was given. However, whistles with a much greater range are available and are now being considered.

As well, the communication procedures and equipment at Cloud Lake were not adequate to handle the extensive search requirements. This is also being reviewed.

Some of the best lessons come from Sgt Leger herself. She has experienced what few people will, and we can learn from what she tells us. She says, "When you realize you are lost the first thing is to stop and sit, observe your surroundings and plan anything you will need such as shelter, fire, food and so on. This is exactly what I did. The hardest part of the ordeal was not to let fear conquer my mind, especially at night. A trick to staying calm at night is to sleep. You have to keep saying to yourself that someone will eventually find you, maybe not today or tomorrow but eventually."

She believes that when you're lost in the bush and alone with your mind, you have to use it to your advantage. "Your mind is a very powerful thing. If you think of all the horrible things that could happen, you'll get nothing accomplished. If you're hungry, convince yourself that you're not hungry! Make yourself laugh!

Talk to rocks, trees...anything. I was lucky enough to have a 'pet' squirrel! I told him that he could be my buddy for now but in a few days, if I wasn't found, he'd be my lunch. While doing this, you almost forget you are lost. Even if it is for only a second, it really helps a lot."

The incident was also proof that our training works. Maj Ken Mayo, the chief training officer for Cloud Lake says, "Cadet Leger acted calmly and used her training towards staying safe for that night. She stayed calm throughout and kept to the general area where she was when she realized she was lost. The training that we give our cadets is effective and useful in real world situations."

Sgt Leger agrees. "The outcome could have been worse, but it wasn't — thanks to the training I received prior to this exercise. I'd highly recommend this course to any cadet."

Sgt Leger and her parents are thankful to those who helped in the search. They believe that "an exemplary team effort was the key to the happy ending." The cadet adds, "No-one knows how seeing them felt when they found me!"

Cadet Leger stayed to finish her course. Her parents agreed with her choice. Two days later, they sent her younger brother to the three-week physical education and recreation training course. As Mrs. Leger put it, "everyone got back on the horse." 🐾

**"THE HARDEST  
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— Capt MacDonald is the regional public affairs officer, Atlantic

**"IF YOU'RE  
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THAT YOU'RE  
NOT HUNGRY!  
MAKE YOUR-  
SELF LAUGH!  
TALK  
TO ROCKS,  
TREES...  
ANYTHING."**



## ROYAL CANADIAN ARMY CADETS

### RED STAR

### INSTRUCTIONAL GUIDE



## SECTION 2

### EO M224.02 – IDENTIFY THE SEVEN ENEMIES OF SURVIVAL

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-702/PG-001, 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.

Copy the handout located at Annex A for each cadet.

#### PRE-LESSON ASSIGNMENT

N/A.

#### APPROACH

An interactive lecture was chosen for this lesson to orient the cadets to the seven enemies of survival and to present background material.

### INTRODUCTION

#### REVIEW

N/A.

#### OBJECTIVES

By the end of this lesson the cadet shall have identified the seven enemies of survival.

#### IMPORTANCE

It is important for cadets to understand the seven enemies of survival so they have the knowledge to combat them and increase their chances of survival.

#### Teaching Point 1

#### Explain the Psychology of Wilderness Survival

Time: 5 min

Method: Interactive Lecture

### THE PSYCHOLOGY OF WILDERNESS SURVIVAL

Research has shown that there are a number of factors that influence survival. Stress can have a negative effect on anyone who finds themselves in a survival situation. Sometimes the stress of becoming involved in a

survival situation can result in people making decisions that defy common sense. The inability to make rational decisions has caused injuries and death among rational, sensible people.

It is only natural for people who have been fed, clothed, and have lived in a world of modern convenience to be fearful of trying to provide for their own basic needs. But humans have the will and intelligence to adapt to almost any natural environment on earth. People are much stronger and more capable than they realize.

Survival is more about quality of spirit and character than it is about physical strength. Sometimes, the physically strongest person is the first to give up, while the weakest may show the most determination.

The most important psychological requirement to wilderness survival is to admit the reality of the situation and to react appropriately.

Remember that it is not feasible to have everything one wants, but one can have everything one needs!



Researchers have shown that children often adapt more easily to survival situations as they have not been conditioned to so much comfort. They are not afraid to get dirty, wet, and make the most fun out of what they do.

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## CONFIRMATION OF TEACHING POINT 1

### QUESTIONS

- Q1. When stressed about being in a survival situation, what do some people forget to use?
- Q2. What is the most important psychological requirement of wilderness survival?
- Q3. Which is more important in a survival situation, spirit and character or physical strength?

### ANTICIPATED ANSWERS

- A1. When stressed about being in a survival situation, some people forget to use their common sense.
- A2. The most important psychological requirement of wilderness survival is to admit the reality of the situation and to react appropriately.
- A3. Spirit and character are more important than physical strength in a survival situation.

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## Teaching Point 2

## Identify and Explain How to Combat the Seven Enemies of Survival

Time: 20 min

Method: Interactive Lecture



Challenge cadets to think about what the seven enemies of survival may be. As cadets guess the seven enemies review the points on that enemy as listed below.

## GENERAL

Everyone has experienced the seven enemies of survival—pain, cold, thirst, hunger, fatigue, boredom and loneliness, but not many have experienced them to the point of threatening their survival. In a survival situation, these feelings become more severe and dangerous. The more information known about the seven enemies of survival, the better prepared a cadet will be able to combat them, increasing their chances of survival.

**Pain.** Pain is nature's way of letting the mind know that something is wrong. The mind can postpone the feeling of pain, if the mind and body are distracted doing something else. Once the mind recognizes pain, it can weaken the drive to survive. It can become overwhelming, even if it is not serious or prolonged. Keep spirits up to postpone the feeling of pain.

**Cold.** Cold is a more of a threat than most people think. Cold lowers the ability to think and distracts people from doing much more than thinking about getting warm. Because cold slows the body down, it is easy to feel the need to sleep. Cold numbs the mind, the body and the will. Stay moving to try to get warm.

**Thirst.** Thirst is the hidden enemy of survival. Even when someone has a mild thirst, the mind can feel dull. Like pain and cold, if attention is drawn to it, it can lower the drive to survive. Remember to drink water if it is available and safe. The feeling of thirst can fog the mind. One can become dehydrated even when water is available because they forget to drink or do not force themselves to drink. Lack of water leads to dehydration as well as headaches and nausea.

**Hunger.** The feeling of hunger can affect a person's rational thought. Thirst and hunger can increase the chances of weakening to the effects of cold, pain and fear. This is especially true after three days, when the stomach shrinks and reduces its desire for food.

**Fatigue.** Even a small amount of fatigue (tiredness) can reduce mental ability. It is easy to become lazy and adopt a careless attitude. Fatigue is one of the biggest dangers to wilderness survival and may be responsible for some deaths. Although there is a real danger of over-exertion, fatigue may be caused by a feeling of hopelessness or frustration. Sleep allows someone to escape from a situation they feel may be too difficult to handle.

**Boredom and Loneliness.** Boredom and loneliness are two of the toughest enemies of survival because they are unexpected. When there is nothing to do, feelings of boredom and loneliness may creep up. Try to find some way to keep occupied. Working on a plan allows one to be constructive while staying busy. Building amenities for the site or something as simple as singing and talking can keep the cadet's mind occupied.

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## ACTIVITY

Time: 10 min

### OBJECTIVE

The objective of this activity is to become familiar with the seven enemies of survival.

### RESOURCES

- Copies of the puzzle located at Annex A (one per cadet); and
- Pens or pencils (one per cadet).

### ACTIVITY LAYOUT

N/A.

### ACTIVITY INSTRUCTIONS

1. Distribute a copy of the puzzle to each cadet.
2. Ensure all cadets understand how to complete a crossword puzzle (e.g. explain the difference between across and down answers).

3. Allow five to seven minutes for the cadets to complete the puzzle.
4. Correct the puzzle using the answer sheet located at Annex B.

### **SAFETY**

N/A.

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### **CONFIRMATION OF TEACHING POINT 2**

The cadets' participation in the activity will serve as the confirmation of this TP.

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### **END OF LESSON CONFIRMATION**

### **QUESTIONS**

- Q1. When stressed about being in a survival situation, what do some people forget to use?
- Q2. What are the seven enemies of survival?
- Q3. Why are boredom and loneliness two of the toughest enemies of survival?

### **ANTICIPATED ANSWERS**

- A1. When stressed about being in a survival situation, some people forget to use their common sense.
  - A2. The seven enemies of survival are pain, cold, thirst, hunger, fatigue, and boredom and loneliness.
  - A3. Boredom and loneliness are often unexpected and can creep up on you.
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### **CONCLUSION**

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### **HOMEWORK/READING/PRACTICE**

N/A.

### **METHOD OF EVALUATION**

N/A.

### **CLOSING STATEMENT**

Being in the right frame of mind can make a great difference in how well one adapts in a survival situation. Knowing the seven enemies of survival can greatly increase your chances of combating them, if you become lost.

### **INSTRUCTOR NOTES/REMARKS**

N/A.

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### **REFERENCES**

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A2-046 B-GA-217-001/PT-001 *Down But Not Out*. (ND). Ottawa, ON: Department of National Defence.

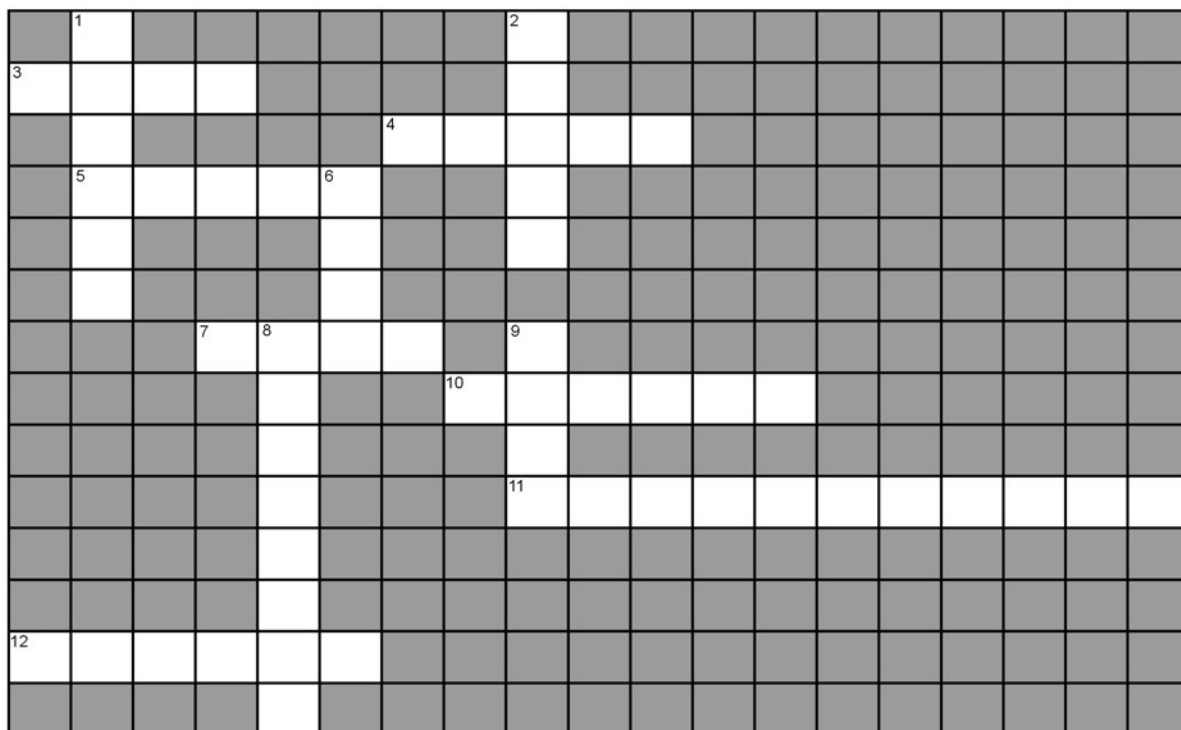
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### ENEMIES OF SURVIVAL PUZZLE



#### ACROSS

3. Nature's way of letting the body know that something's wrong.
4. After about \_\_\_\_ days, the stomach will shrink.
5. \_\_\_\_ allows someone to escape from a difficult situation.
7. Singing and talking are great ways to keep the \_\_\_\_ occupied.
10. When cold, keep the body \_\_\_\_.
11. A way to postpone pain.
12. \_\_\_\_ is the hidden enemy of survival.

#### DOWN

1. Lack of water can lead to dehydration, headaches and \_\_\_\_.
2. When \_\_\_\_, try to find something to stay occupied.
6. Working on a \_\_\_\_ allows one to be constructive while staying busy.
8. Thirst and hunger can \_\_\_\_ the chances of weakening to the effects of cold, pain and fear.
9. The body slows down it is \_\_\_\_.

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**ENEMIES OF SURVIVAL PUZZLE – ANSWER KEY**

	<sup>1</sup> N								<sup>2</sup> B										
<sup>3</sup> P	A	I	N						O										
	U						<sup>4</sup> T	H	R	E	E								
	<sup>5</sup> S	L	E	E	<sup>6</sup> P				E										
	E				L				D										
	A				A														
			<sup>7</sup> M	<sup>8</sup> I	N	D			<sup>9</sup> C										
				N				<sup>10</sup> M	O	V	I	N	G						
				C					L										
				R					<sup>11</sup> D	I	S	T	R	A	C	T	I	O	N
				E															
				A															
<sup>12</sup> T	H	I	R	S	T														
				E															

**ACROSS**

- Nature's way of letting the body know that something's wrong.
- After about \_\_\_\_ days, the stomach will shrink.
- \_\_\_\_ allows someone to escape from a difficult situation.
- Singing and talking are great ways to keep the \_\_\_\_ occupied.
- When cold, keep the body \_\_\_\_.
- A way to postpone pain.
- \_\_\_\_ is the hidden enemy of survival.

**DOWN**

- Lack of water can lead to dehydration, headaches and \_\_\_\_.
- When \_\_\_\_, try to find something to stay occupied.
- Working on a \_\_\_\_ allows one to be constructive while staying busy.
- Thirst and hunger can \_\_\_\_ the chances of weakening to the effects of cold, pain and fear.
- The body slows down it is \_\_\_\_.

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## ROYAL CANADIAN ARMY CADETS

### RED STAR

### INSTRUCTIONAL GUIDE



### SECTION 3

### EO M224.03 – PREDICT WEATHER USING CLOUD FORMATIONS

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Total Time: 30 min

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### PREPARATION

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#### PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-702/PG-001, 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

N/A.

#### APPROACH

An interactive lecture was chosen for this lesson to introduce predicting weather using cloud formations as a new subject and to present basic or background material.

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### INTRODUCTION

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#### REVIEW

N/A.

#### OBJECTIVES

By the end of this lesson the cadet shall be expected to predict the weather using cloud formations.

#### IMPORTANCE

It is important for cadets to learn to predict weather using cloud formations so they can factor the weather into their survival plan, if they become lost. The weather will play an important role when selecting the best action to take while waiting for assistance from rescuers and when deciding the type of shelter to seek or construct.

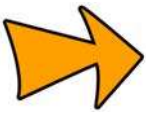
**Teaching Point 1****Identify Types of Clouds**

Time: 15 min

Method: Interactive Lecture

**TYPES OF CLOUD FORMATIONS**

The terms cumulus and stratus are used in most cloud names. In most cases, the height of a cloud will be the prefix (beginning element of a word) and the type will be the suffix (the end element of a word). Discuss the types of cloud formations.



Cloud names come from Latin. Some common words are:

- cirro = high;
- alto = middle;
- nimbus = rain;
- cirrus = curl;
- stratus (as a prefix) = low;
- stratus (as a suffix) = layer; and
- cumulus = pile.

Clouds are classified into two categories based on how they are formed – cumulus and stratus.

**Cumulus.** The typical clumpy, “puffy” cloud is formed in rising air currents. Cumulus clouds are evidence of unstable air conditions. Cumulus clouds are formed when small areas of rising air cool to the saturation point.

**Stratus.** These appear “spread out” and in sheets or horizontal layers. Stratus clouds are formed when a layer of moist air is cooled below its saturation point.



Precipitation falls from nimbus clouds.



Cool air can hold less water than warm air. As a given amount of air cools, humidity increases. When the humidity reaches 100 percent, clouds form. This is the saturation point.

**FAMILIES OF CLOUDS**

This section includes descriptions of clouds found in each family and weather predictions for each.

Cadets should be able to describe the look of each cloud. Weather will be discussed further in TP2.

Clouds are classified into four families – high clouds, middle clouds, low clouds and clouds of vertical development.

## High Clouds

These clouds are very high in the sky and are composed of ice crystals. High clouds have the prefix “cirro”. There are three types – cirrus, cirrocumulus, and cirrostratus.

**Cirrus.** These clouds are wispy and look like cotton candy being pulled. They appear to be whitish wisps of cloud and are usually an indicator of fair weather.



Figure 1 Cirrus Clouds

*Brotak, E., Wild About Weather, A Division of Sterling Publishing Co., Inc. (p. 87)*

**Cirrostratus.** These clouds are whitish sheets that completely cover the sky. Cirrostratus clouds are normally see-through. When these clouds are in the sky, one can expect precipitation in a day or two.



Figure 2 Cirrostratus Clouds

*Brotak, E., Wild About Weather, A Division of Sterling Publishing Co., Inc. (p. 87)*

**Cirrocumulus.** These clouds are little, white and puffy. They form a huge sheet, covering the sky. When cirrocumulus clouds are in the sky, one can predict fair weather.



Figure 3 Cirrocumulus

*Brotak, E., Wild About Weather, A Division of Sterling Publishing Co., Inc. (p. 87)*

### **Middle Clouds**

These clouds are in the middle of the sky and are composed of ice crystals or water droplets. Middle clouds have the prefix “alto”. There are two main types – altocumulus and altostratus.

**Altocumulus.** These clouds are very big and can be white or grey. They appear as a layer or a series of patches of rounded masses. Altocumulus clouds can be seen before fair or bad weather and have little value as an indicator of future weather developments.



Figure 4 Altocumulus

*Brotak, E., Wild About Weather, A Division of Sterling Publishing Co., Inc. (p. 87)*

**Altostratus.** These clouds appear as a greyish or whitish sheet that completely covers the sky. The sun can vaguely be seen through it. Altostratus clouds indicate increasing moisture and usually precede precipitation by 24 hours or less.





Figure 5 Altostratus

*Brotak, E., Wild About Weather, A Division of Sterling Publishing Co., Inc. (p. 87)*

### Low Clouds

These clouds are low in the sky and are composed of water droplets. Low clouds are associated with “stratus”. There are three types – stratus, stratocumulus, and nimbostratus.

**Stratus.** These clouds appear as low, dull, greyish sheets that completely cover the sky (resembling fog). During the day, the sun cannot be seen. They can produce drizzle or very light rain or snow. When deep clouds are above, the rain or snow can be heavier.



Figure 6 Stratus

*Brotak, E., Wild About Weather, A Division of Sterling Publishing Co., Inc. (p. 87)*

**Stratocumulus.** These appear as sheets of big puffy white or grey clouds. Stratocumulus clouds often appear in dark patches or rolls and are often thin with blue sky showing through the breaks. Snow or showers of rain are possible and can be heavy.



Figure 7 Stratocumulus

*Brotak, E., Wild About Weather, A Division of Sterling Publishing Co., Inc. (p. 87)*

**Nimbostratus.** These appear as dark grey layers of large, puffy clouds. When they produce precipitation, it is in the form of continuous rain or snow. The bottom of this cloud is often hidden by falling rain or snow, which may be heavy.



Figure 8 Nimbostratus

*Brotak, E., Wild About Weather, A Division of Sterling Publishing Co., Inc. (p. 88)*

### **Clouds of Vertical Development**

These clouds may be very low in the sky. When the temperature is above freezing (higher than zero degrees), they are composed of water droplets. When the temperature is below freezing (lower than zero degrees), they are composed of ice crystals and water droplets. Clouds of vertical development are associated with “cumulus”. There are three types – cumulus, towering cumulus, and cumulonimbus.

**Cumulus.** These clouds are large, individual puffy clouds. They resemble cauliflower or cotton balls. The bottoms often appear dark and flat. They can often be seen on a warm day. When these clouds are in the sky one can expect fair weather, unless they begin to extend upwards.



Figure 9 Cumulus

*Brotak, E., Wild About Weather, A Division of Sterling Publishing Co., Inc. (p. 88)*

**Towering Cumulus.** These clouds build up into high towering masses. They have puffy, white tops but very dark bottoms. Towering cumulus clouds can produce showers and may develop into heavy ice or thunderstorms.



Figure 10 Towering Cumulus

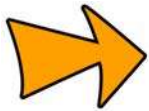
*Brotak, E., Wild About Weather, A Division of Sterling Publishing Co., Inc. (p. 88)*

**Cumulonimbus.** These clouds are very dark at the bottom. They extend way up into the atmosphere and have flattened tops. When cumulonimbus clouds are in the sky, one can predict thunderstorms and windy, rainy conditions.



Figure 11 Cumulonimbus

*Brotak, E., Wild About Weather, A Division of Sterling Publishing Co., Inc. (p. 89)*



The long, narrow white clouds left behind jet airplanes are called contrails. They are formed by the moisture coming out of the engine and condensing in the very cold air.

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## CONFIRMATION OF TEACHING POINT 1

### QUESTIONS

- Q1. What are the three clouds found in the high cloud family?
- Q2. What does an altocumulus cloud look like?
- Q3. What does a nimbostratus clouds look like?

### ANTICIPATED ANSWERS

- A1. Cirrus, cirrostratus and cirrocumulus.
- A2. These clouds are very big and can be white or grey. They appear as a layer or a series of patches of rounded masses.
- A3. These appear as dark grey layers of large, puffy clouds.

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## Teaching Point 2

## Discuss How to Predict Approaching Weather Using Clouds

Time: 10 min

Method: Interactive Lecture

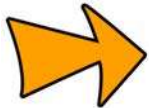


Being able to forecast weather using clouds is a great tool in the field. Discuss the signs that clouds give when the weather is going to change.

## BAD WEATHER

When the weather is going to **change for the worse**, one will notice several general cloud activities. Signs of change for the worse are:

- Clouds (regardless of their formation) are thickening (darkening), increasing in number or joining together, forming layers, and/or lowering in elevation.
- Clouds are forming banks in the west with winds from the south.
- Clouds are moving in all directions, or contrary to the ground wind.
- Altostratus clouds are darkening and lowering.
- Altocumulus clouds are moving quickly across the sky or forming towers in the morning.
- Cumulus clouds are forming in the morning and stacking in the afternoon or moving from the south or south-west.



A halo around the moon indicates that the weather is going to change for the worse.

## GOOD WEATHER

When the weather is going to **change for the better**, one will notice several general cloud activities. Signs of a change for the better are:

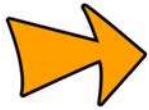
- Cloud cover is lifting, becoming lighter and small patches of blue sky are developing.
- Cumulus clouds are forming in the afternoon or floating alone without stacking.
- Stratocumulus clouds are drifting with the prevailing wind and remaining scattered.
- The condensation trail ('contrail') left by high altitude aircraft is dispersing quickly.
- Morning fog is burning off before noon.

## THUNDERSTORMS/LIGHTNING

**Thunderstorms.** Thunderstorms are most common in the summertime. They are formed by cumulus clouds, feeding off warm and moist air. These clouds grow quickly during the day, driven by the heat from the sun. When dark cumulonimbus clouds begin to approach, one can expect a thunderstorm. The big feature of a thunderstorm is lightning.

**Lightning.** Lightning is an electrical discharge in the atmosphere. When cumulus clouds grow tall, they develop an electrical field. The top of the cloud, where there are lots of ice crystals, is normally positive. The bottom part of the cloud, filled with rain droplets, is normally negative. The ground has a positive charge. An electrical charge builds up and the atmosphere produces lightning.

**Thunder.** Thunder is the sound made when a lightning bolt heats the air and expands quickly. Since sound moves much slower than light, one can judge how far away a lightning bolt is by counting the seconds between seeing the flash and hearing the thunder. Each three second interval equals about one kilometre.



The fear of lightning is called *astraphobia*. The fear of thunder is called *brontophobia*.



As mentioned in TP1, weather can also be predicted simply from knowing the type of cloud in the sky. Discuss the expected weather for each type of cloud.

<b>HIGH CLOUDS</b>	
Cirrus	Normally an indicator of fair weather.
Cirrocumulus	Expect precipitation in a day or two.
Cirrostratus	Predict fair weather.
<b>MIDDLE CLOUDS</b>	
Altostratus	Normally seen before fair or bad weather. Have little value as an indicator of future weather developments.
Altostratus	Expect precipitation in 24 hours or less.
<b>LOW CLOUDS</b>	
Stratus	Expect drizzle, light rain or snow.
Stratocumulus	Snow or showers are possible and can be heavy.
Nimbostratus	Expect rain or snow.
<b>CLOUDS OF VERTICAL DEVELOPMENT</b>	
Cumulus	Expect fair weather, unless they begin to extend upwards.
Towering Cumulus	Expect showers. May develop into heavy ice or thunderstorms.
Cumulonimbus	Expect thunderstorms and showery conditions.

## CONFIRMATION OF TEACHING POINT 2

### QUESTIONS

- Q1. What are the common signs of a change in the weather for the worse?
- Q2. What are the two middle clouds and what weather can be predicted when they are seen in the sky?
- Q3. What is lightning?

**ANTICIPATED ANSWERS**

A1. Signs of change for the worse are:

- Clouds (regardless of their formation) are thickening (darkening), increasing in number or joining together, forming layers, and/or lowering in elevation.
- Clouds are forming banks in the west with winds from the south.
- Clouds are moving in all directions, or contrary to the ground wind.
- Altostratus clouds are darkening and lowering.
- Altocumulus clouds are moving quickly across the sky or forming turrets in the morning.
- Cumulus clouds are forming in the morning and stacking in the afternoon or moving from the south or south-west.

A2.

<b>MIDDLE CLOUDS</b>	
Altocumulus	Normally seen before fair or bad weather. Have little value as an indicator of future weather developments.
Altostratus	Expect precipitation in 24 hours or less.

A3. Lightning is an electrical discharge in the atmosphere. When cumulus clouds grow tall, they develop an electrical field. The top of the cloud, where there are lots of ice crystals, is normally positive. The bottom part of the cloud, filled with rain droplets, is normally negative. The ground has a relatively positive charge. An electrical charge builds up and the atmosphere produces lightning.

**END OF LESSON CONFIRMATION****QUESTIONS**

- Q1. What are the three high clouds, including their description and weather prediction?
- Q2. What are the three types of low clouds, including their description and weather prediction?
- Q3. What are the common signs of a change in the weather for the better?

**ANTICIPATED ANSWERS**

A1. The high clouds include:

- **Cirrus.** These clouds are wispy and look like cotton candy being pulled. They have whitish wisps of cloud and are usually an indicator of fair weather.
- **Cirrostratus.** These clouds are whitish sheets that completely cover the sky. They are normally see-through. When these clouds are in the sky, one can expect precipitation in a day or two.
- **Cirrocumulus.** These clouds are little, white and puffy. They form a huge sheet, covering the sky. When these clouds are in the sky, one can predict fair weather.

A2. The low clouds include:

- **Stratus.** These clouds are low, dull, greyish sheets that completely cover the sky (resembling fog). During the day, the sun cannot be seen. They can produce drizzle or very light rain or snow. When deep clouds are above, the rain or snow can be heavier.
- **Stratocumulus.** These are sheets of big puffy white or grey clouds. They are often in dark patches or rolls and are often thin with blue sky showing through the breaks. Snow or showers of rain are possible and can be heavy.
- **Nimbostratus.** These are dark grey layers of large, puffy clouds. When they produce precipitation, it is in the form of continuous rain or snow. The bottom of this cloud is often hidden by falling rain or snow, which may be heavy.

A3. Signs of change for the better are:

- Cloud cover is lifting, becoming lighter and small patches of blue sky are developing.
- Cumulus clouds are forming in the afternoon or floating alone without stacking.
- Stratocumulus clouds are drifting with the prevailing wind and remaining scattered.
- The condensation trail ('contrail') left by high altitude aircraft is dispersing quickly.
- Morning fog is burning off before noon.

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## CONCLUSION

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### HOMEWORK/READING/PRACTICE

N/A.

### METHOD OF EVALUATION

N/A.

### CLOSING STATEMENT

Being able to use the clouds to predict weather is a great tool when in a survival situation and when in the field. Weather is an important aspect of planning in any survival situation with respect to the type of shelter selected and the best course of action to take.

### INSTRUCTOR NOTES/REMARKS

N/A.

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## REFERENCES

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## ROYAL CANADIAN ARMY CADETS

### RED STAR

### INSTRUCTIONAL GUIDE



### SECTION 4

### EO M224.04 – IDENTIFY EMERGENCY SHELTERS

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-702/PG-001, 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.

Seek out or construct shelters for TP2 and TP3. It is imperative that cadets have a visual example of each shelter. However, it is understood that terrain differences may limit the ability to locate all shelters mentioned.



The definition of leeward is on or towards the side sheltered from the wind (e.g. if the wind is blowing against the front of a car the leeward side would be the rear of the car.)

#### PRE-LESSON ASSIGNMENT

N/A.

#### APPROACH

An interactive lecture was chosen for TP1 to TP3 to introduce factors to consider when identifying emergency shelters as a new subject and to present basic or background material.

A practical activity was chosen for TP4 as it is an interactive way to allow cadets to seek out emergency shelters in a natural setting.

### INTRODUCTION

#### REVIEW

The review for this lesson is from the previous lesson M224.01 (Describe Immediate Actions To Take When Lost).

## QUESTIONS

- Q1. What does the acronym S.T.O.P stand for?
- Q2. What are the five elements of survival?
- Q3. What is the second element of survival when you find you are lost?

## ANTICIPATED ANSWERS

- A1. Sit, Think, Observe, Plan.
- A2. Attitude, shelter, water, fire and food.
- A3. Shelter.

## OBJECTIVES

By the end of this lesson the cadet shall be expected to identify emergency shelters that are natural or improvised and ensure their site chosen will provide them with comfort throughout their stay.

## IMPORTANCE

It is important for cadets to be able to identify a shelter or construct an emergency shelter because shelter is identified as one of the elements of survival. Construction of a shelter is the second survival element that should be completed once the cadets know they are lost.

---

### Teaching Point 1

### Explain Factors to Consider When Selecting a Site for an Emergency Shelter

Time: 15 min

Method: Interactive Lecture

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The instruction area for this lesson will meet the factors of site selection as detailed in TP1.

Cadets will be expected to identify a type of shelter by the end of this lesson. Introduce this TP by presenting the cadets with a scenario where they have become lost in the field and they have only a few hours of daylight left.

Shelter is their first concern. The location chosen to demonstrate the selection of a site should meet most if not all considerations when choosing a location. Question the cadets enquiring what they currently think of the location. These questions should get their thoughts thinking about what considerations they would take into account when choosing a site.

Continue this lesson by identifying the rest of the factors and considerations described in TP1.

During the summer months the need for shelter is not always a great concern however it should be. Even in winter a survivor may be tempted to set up a fire the first night rather than tackle the job of building or finding a shelter. When discussing the five elements of survival, shelter is the second survival element, before fire. A shelter provides protection from the elements, particularly wind and precipitation. Shelters improve morale and survival chances by providing comfort, security and a sense of accomplishment.

## TERRAIN CONSIDERATIONS

**There are Several Factors that Must be Considered When Selecting a Site.** Locations to construct a shelter should meet certain criteria, to avoid being awoken during the night due to an over-looked problem.

**Select an Area that is Large Enough for the Planned Shelter.** Possible sites that are perfect in their natural form may be too small to accommodate the size of one person. Ensure that the site chosen can comfortably, considering the situation, fit oneself for the duration of the survival situation.

**Select an Area that is Elevated and Provides Drainage.** A site should provide dry footing and drainage of future rains. Keep back from rivers or lakes which may flood after a rain fall.

**Identify Sheltered Areas that Protect From Wind, Rain and Sun.** Shelter from the wind, rain and sun can be sought from boulders, hillsides, trees or whatever source may be available. In the summer a little breeze will reduce the number of insects and can keep one cool during hot summer days. During winter a shelter will separate the body from the elements and provide warmth. If the entrance of the shelter faces leeward (away from the wind), rain or snow will swirl over and drop inside. If the entrance faces windward, smoke and ashes from the fire will blow into the shelter. Place the back of the shelter into the wind (see Figure 6).

## LOCATION CONSIDERATIONS

**Proximity to a Water Source that Provides Potable Water and Food from Fishing.** The availability of a nearby water source will reduce the amount of energy expended while collecting water. A source of water may also provide fishing grounds that may supply food.

**Proximity to a Fuel Source for Fire During Cold Weather.** Situating a shelter near a fuel source will reduce the amount of energy required to gather enough fuel for the fire.

**Proximity to Building Materials.** Although the shelter is an emergency shelter there is always the need to make what is natural more liveable. Situating the shelter near building supplies will reduce the amount of energy required to build and secure the shelter.

**Proximity to Animal Trails or Holes.** In the wild, the food chain is active. Beware of locating your shelter near the natural paths animals create. Where there are animals, there may be danger.

**Select Areas that are Close to or can be Seen by Aircraft From Above.** When lost in a wilderness area it is important to remember you have to establish contact with or attract the attention of searchers and rescuers. Staying in a site that is easily seen from above will increase your chances of being rescued.

**Estimate the Time Required to Build a Shelter Before Night Fall.** Depending on the amount of time available, one may choose to construct a simple emergency shelter for the night. Estimate the amount of daylight left when constructing a shelter by looking at the horizon. If the sun is near the horizon, there is not much daylight left.

**The Entrance Should be Sheltered From the Wind and Preferably in the Direction of the Sun.** Situating the shelter so the prevailing wind is blowing against the rear will help ensure the occupant will be able to maintain some heat inside. Face the entrance, if possible, into the sun allowing the sunshine into the shelter. This provides heat to the occupant.

## CONFIRMATION OF TEACHING POINT 1

### QUESTIONS

- Q1. What are three terrain considerations one should take into account when selecting a shelter site?
- Q2. What are three considerations of a site location that one should take into account?
- Q3. Which way should the entrance of a shelter face?

## ANTICIPATED ANSWERS

- A1. Select an area that is large enough for the planned shelter, elevated and provides drainage, and helps protect from the wind, rain and sun.
- A2. The location should be in close proximity to a water source that provides potable water and food from fishing. It should also be close to building materials but far from animal trails or holes.
- A3. The entrance should face the leeward side (away from the wind).

---

### Teaching Point 2

### Identify Types of Natural Shelters

Time: 5 min

Method: Interactive Lecture

---



Conduct a tour of actual shelters. Examples help illustrate what each shelter looks like and provide cadets with insight into each shelter's purpose.

Have cadets inspect each shelter type.

## TREE HOLLOW

A tree hollow is a good natural shelter that can be used in a hurry when there is little time to construct something more permanent. It is often found under a tree, especially a large conifer. Lower branches hanging over the hollow may form a kind of roof to block out the wind and rain.



Figure 1 Tree Hollow

*Berger, K., Backpacking and Hiking, DK Publishing, Inc. (p. 203)*

## CAVE

A cave is an ideal shelter as it offers a roof, constant temperature and is secure.

Caves are found along cliffs or along coast lines especially if the water levels have receded; however, these caves most likely were formed by wave action. Be cautious of high tide.

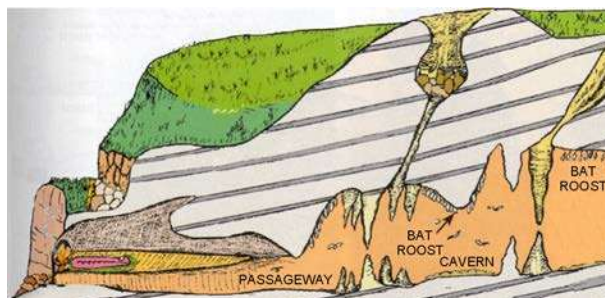


Figure 2 Cave

*Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 409)*

## ROOT SHELTER

A root shelter will provide good separation from the wind with little preparation. Be cautious as water tends to pool at the base of the roots during a rain fall. The roots are used as the frame for the shelter and are located at the base of a fallen tree. Add additional branches or boughs as a windbreak and dig into the ground to improve the shelter.



Figure 3 Root Shelter

*Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 397)*

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## CONFIRMATION OF TEACHING POINT 2

The cadets' inspection of natural shelters will serve as the confirmation of this TP.

---

### Teaching Point 3

### Identify Types of Improvised Shelters

Time: 10 min

Method: Interactive Lecture



Conduct a tour of actual shelters. Examples help illustrate what each shelter looks like and provide cadets with insight into each shelter's purpose.

Have cadets inspect each shelter type.

An improvised shelter is constructed from whatever is available, with little preparation. The type of shelter built will depend on local weather conditions, the materials available and how long the shelter is needed.

## BOUGH SHELTER

A bough shelter, also known as a lopped tree shelter, makes use of a naturally fallen tree. With some preparation this shelter provides good cover from the elements. The fallen tree branches are cut from the centre of the tree, creating a hollow for shelter. The excess branches are woven through the remaining tree branches, making the shelter weatherproof.



Figure 4 Bough Shelter

*Wiseman, J., The SAS Survival Handbook, HarperCollins Publishers (p. 245)*

## FALLEN TRUNK

A log or fallen tree trunk makes a useful wind break on its own if it is against the wind. This shelter can be a quickly prepared temporary shelter when time for construction is limited; however, it can be developed into a more permanent shelter with some additional preparation.

If the trunk is small scoop out a hollow in the ground to increase the size of the shelter. The hollow should be opposite the wind (leeward side). A log also makes an excellent support for a lean-to roof of boughs.



Figure 5 Fallen Trunk

*Wiseman, J., The SAS Survival Handbook, HarperCollins Publishers (p. 245)*

## LEAN-TO

The lean-to is one of the most practical and multipurpose shelters. It is easy to assemble and can be built using a support structure of two trees and some poles.

This shelter is constructed by erecting a horizontal crosspiece between trees. On the side facing towards the wind, lean sticks or branches at a 45 degree angle making a roof, and cover the roof with boughs to provide windproofing and waterproofing. If required, add cross ribbing to the roof to provide support for the objects that cover the roof. When using boughs, ensure they are laid upside down to allow rain to run off. Side walls can be added if necessary.





Figure 6 Lean-To

*Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 457)*

## SNOW CAVE

A snow cave is made from snow drifts and typically provides shelter for a night or two.

To construct a snow cave, dig into a firm large snowdrift, make an entry hole at the low side of the drift and dig up from the entrance to carve out a sleeping shelf.

Block the entry hole with snow and poke ventilation holes in the ceiling to provide plenty of fresh air.



Figure 7 Snow Cave

*Berger, K., Backpacking and Hiking, DK Publishing, Inc. (p. 203)*

## TEPEE

The tepee was developed by nomadic people, it can act as a more permanent shelter.

The tepee is a series of poles sloped in to lean against each other. The sloped poles can be covered with materials to provide a wind break or completely made up of poles. Depending on the materials at hand, they can be constructed quickly.



Figure 8 Tepee

*Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 105)*

---

**CONFIRMATION OF TEACHING POINT 3**

The cadets' inspection of improvised shelters will serve as the confirmation of this TP.

---

**Teaching Point 4****Locate Natural or Improvised Shelter Sites**

Time: 20 min

Method: Practical Activity

---

**ACTIVITY****OBJECTIVE**

The objective of this activity is to allow the cadets to seek out natural shelters or improvised shelter locations.

**RESOURCES**

N/A.

**ACTIVITY LAYOUT**

Provide boundaries for cadets to explore.

**ACTIVITY INSTRUCTIONS**

- Divide cadets into groups of three or four.
- Have cadets seek out natural shelters and shelter locations.
- Cadets will have 15 minutes to identify a natural shelter or an improvised shelter location.
- Confirm each group has identified an appropriate shelter or shelter location.

**SAFETY**

The area chosen to conduct this activity will be given boundaries so the cadets will not wander off searching for natural shelters and setting up improvised shelters. A larger area may be used if additional supervision is provided.

---

**END OF LESSON CONFIRMATION**

The cadets' participation in the activity in TP4 will serve as the confirmation of this lesson.

---

**CONCLUSION**

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**HOMEWORK/READING/PRACTICE**

N/A.

**METHOD OF EVALUATION**

N/A.

**CLOSING STATEMENT**

Any cadet who is lost can find a natural shelter or construct a shelter quickly. Remember finding shelter is the second element to survival.

A cadet in a survival situation will now have the knowledge to find a shelter and prolong life while awaiting rescue.

**INSTRUCTOR NOTES/REMARKS**

N/A.

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**REFERENCES**

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**ROYAL CANADIAN ARMY CADETS**  
**RED STAR**  
**INSTRUCTIONAL GUIDE**



**SECTION 5**

**EO M224.05 – PREPARE, LIGHT, MAINTAIN, AND EXTINGUISH A FIRE**

Total Time:

90 min

**PREPARATION**

**PRE-LESSON INSTRUCTIONS**

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-702/PG-001, 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.

Prior to this lesson select a site to construct a fire and construct the following fires:

- tepee;
- crossbed; and
- crisscross/pyramid.

Have examples of fuel types as training aids.

**PRE-LESSON ASSIGNMENT**

N/A.

**APPROACH**

An interactive lecture was chosen for TP1 and TP2 to introduce fire safety for preparing, lighting, maintaining, and extinguishing a fire.

Demonstration was chosen for TP3 as it allows the instructor to explain and demonstrate preparing, lighting, maintaining and extinguishing a fire.

A practical activity was chosen for TP4 as it is an interactive way to introduce cadets to preparing, lighting, maintaining, and extinguishing a fire, while allowing the cadets to experience this activity in a safe and controlled environment.

**INTRODUCTION**

**REVIEW**

N/A.

**OBJECTIVES**

By the end of this lesson the cadet shall be expected to prepare, light, maintain, and extinguish a fire.

## IMPORTANCE

It is important for cadets to prepare, light, maintain and extinguish fires because, as one of the elements of survival, fire provides heat, a means to cook food and can be a signal for rescuers if the cadet becomes lost.

---

### Teaching Point 1

### Discuss Fire Safety and the Steps to Follow When Lighting a Fire

Time: 10 min

Method: Interactive Lecture

---



Discuss how the Fire Weather Index and the Canadian Forest Fire Danger Rating System (CFFDRS) measures the possibility of forest fires.

Some cadets may have already experienced lighting a fire with other organizations.

Pay particular attention to any individuals who may exhibit bad habits when dealing with fire and work to correct their bad habits.

Safety is paramount when lighting a fire. Be sure fire safety equipment is available when lighting fires.

Fire has a strong, positive, psychological impact upon an individual in a survival situation. Fire is the most important survival tool after personal wilderness knowledge and is the fourth element to survival.

Lighting fires in the wilderness requires responsibility. Before planning to light a fire, whether in a survival situation or a weekend bivouac FTX, consideration must be given to the condition of the environment. Check with the appropriate authorities to obtain and review the fire regulations and restrictions for the training area.

## FIRE WEATHER INDEX



Before conducting training in provincial or national parks, one must confirm that fires are allowed. Open fires are normally only allowed in designated areas. Open fires are fires that are not contained in a structure or housing that ensures the fire will not spread (e.g. barrel or fireplace).

Each park will clearly state their fire regulations and restrictions.

Parks commonly follow the Fire Weather Index, which provides an assessment of relative fire potential that is based solely on weather observations. Check with park administration for rules and regulations when planning to light fires within the park boundaries.

## CANADIAN FOREST FIRE DANGER RATING SYSTEM (CFFDRS)

The CFFDRS is Canada's national system for rating forest fire danger. The system evaluates and integrates data to help managers predict woodland fire potential.

The CFFDRS provides an index (shown below) on how easy it is to ignite vegetation, how difficult a fire may be to control, and how much damage a fire may do.

BLUE	GREEN	YELLOW	ORANGE	RED
LOW	MODERATE	HIGH	VERY HIGH	EXTREME

Figure 1 Fire Index

*D Cdts 3, 2007, Ottawa, ON: Department of National Defence*

**Low.** Low chance of fires occurring. Fires that do occur are likely to be self-extinguishing and new ignitions are unlikely.

**Moderate.** Moderate chance of fires starting. These fires are creeping or gentle surface fires. They are easily contained by ground crews with water pumps.

**High.** High chance of fire starting. These fires are challenging for ground crews to handle and heavy equipment (tanker trucks and aircraft) are often required to contain the fire.

**Very High.** Very high chance of a fire starting. These fires are fast spreading and are of high intensity. They are hard to control and require aircraft support.

**Extreme.** The environment is very dry and chances of fire are extreme. These fires are fast spreading, of high intensity and very difficult to control.



Advise cadets they can review this information for themselves by looking up the CFFDRS on the internet for their area at <https://nofc1.cfsnet.nfis.org/mapserver/cwfis/index.phtml>.

## MAINTAINING A SAFE FIRE SITE

Prior to starting a fire, some simple guidelines must be followed. Ensure fire safety equipment is available before starting a fire.

**Shovel.** A shovel provides a means to smother the fire. Shovelling dirt, gravel or sand on a fire reduces oxygen, thus extinguishing the fire.

**Rake.** A rake allows one to disperse burning material away from the fire. A rake can also be used to smother the fire by raking dirt, gravel, or sand onto the fire.

**Pail Filled With Sand or Water.** A pail of water or sand can be immediately thrown over a fire if it starts to get out of control. This item can also be refilled as many times as required.

**Fire Extinguisher.** A fire extinguisher is designed to tackle a fire for a short duration. It is very effective in extinguishing a small fire that is getting out of control.

## CHOOSING A SAFE FIRE LOCATION

Before beginning to build a fire, think about the location. It should be placed for maximum warmth and convenience without sacrificing safety. Consider the following when choosing a safe fire location:

- The fire site should be high and dry.
- The area should be sheltered and away from windy areas to reduce flare ups.
- The site should be clear of over-hanging boughs and branches.
- All combustible materials shall be cleared from the fire site.
- The site should be four to six feet from the shelter entrance.

## PREPARING A FIRE BARRIER

A fire ring or pit is a safety barrier that contains a fire within its boundaries and retains heat. By retaining heat one reduces the fire's ability to spread outside the barrier.

Before constructing a fire ring or pit one must determine how big the fire will be. A small fire is much easier to control and also saves fuel. If the fire pit is dug and walled properly, it can produce as much heat as a large one. The fire ring or pit needs to be prepared carefully. Choose a site that meets fire and location considerations.

### Fire Ring

A fire ring can be made of rocks. The rocks used should be small in size; however they should still be able to contain a small fire. Place the rocks side by side in a circle to complete the ring. The ring will contain the fire. Water-logged rocks should not be used as the moisture contained inside the rocks will expand and cause the rocks to explode with tremendous force.



Figure 2 Fire Ring

*A-CR-CCP-107/PT-001, Royal Canadian Army Cadets Course Training Plan Corps Training Program Winter Adventure Training Manual (p. 3-20)*

### Fire Pit

A fire can also be placed in a pit if no rocks are present. A pit is a dish-shaped hole with gently sloping sides, from six to twelve inches deep, depending on the width of the fire. This depression cradles the fire, grouping its coals toward the centre to help them burn longer and hotter. Be careful not to make the pit too deep, or the heat may not reach the person making the fire.



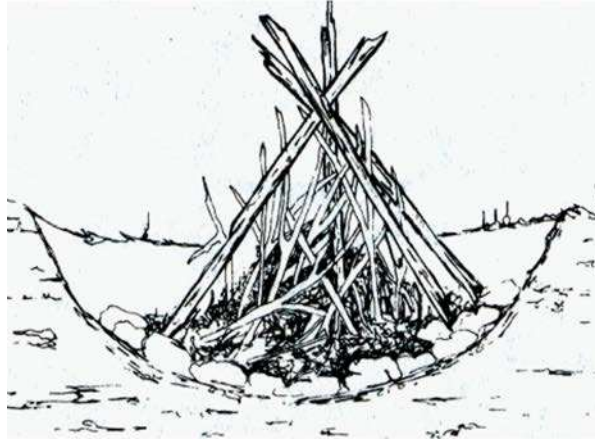


Figure 3 Fire Pit

*Brown, T., Jr. and Morgan, B., Tom Brown's Field Guide: Wilderness Survival, The Berkley Publishing Group. (p. 62)*

## **CONFIRMATION OF TEACHING POINT 1**

### **QUESTIONS**

- Q1. What do the colours of the CFFDRS indicate?
- Q2. What factors should be considered when choosing a safe fire location?
- Q3. How can a fire barrier be made ?

### **ANTICIPATED ANSWERS**

- A1. The colours of the CFFDRS indicate:
- Blue – Low;
  - Green – Moderate;
  - Yellow – High;
  - Orange – Very High; and
  - Red – Extreme.
- A2. A fire location should be:
- high and dry,
  - in an area that is sheltered away from windy areas to reduce flare ups;
  - clear of over-hanging boughs and branches;
  - away from all combustible materials; and
  - four to six feet from the shelter entrance.
- A3. A fire barrier can be made by building a fire ring or a fire pit.

**Teaching Point 2****Identify Characteristics of Fire**

Time: 10 min

Method: Interactive Lecture



Discuss the fire triangle explaining the three elements and the effect the elements have on a fire if one is removed.

Fire may be the difference between living and dying. It will not only heat food for cooking but also keeps a person warm. For a body to produce heat it must burn calories. The warmth of a fire reduces the burden of the body to produce heat.

Fire has a great benefit to a cadet in the field. It can dry clothes, provide comfort and scare away dangerous animals. Its smoke also keeps away insects and pests.

**THE FIRE TRIANGLE**

Fire is a chemical reaction in which energy in the form of heat is produced. When forest fuels burn there is a chemical combination between the air (oxygen), fuel (wood) and heat that allows a fire to be produced. The sides of the fire triangle represent air, heat, and fuel. If any one of these sides is removed, the fire triangle collapses and the fire goes out.



For fire to take place there must be:

- air (oxygen);
- fuel to burn; and
- heat to start and continue the combustion process.

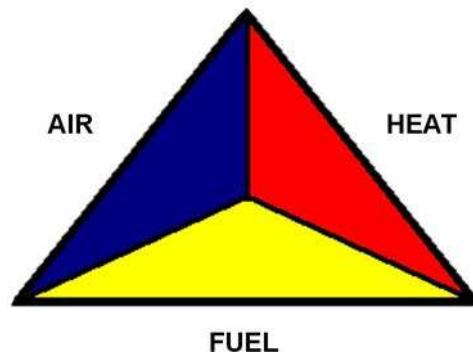


Figure 4 Fire Triangle

*D Cdts 3, 2007, Ottawa, ON: Department of National Defence*

**TYPES OF FUEL**

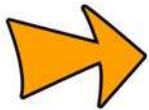
Fire requires fuel to burn. When preparing to light a fire it is important to find enough fuel to supply the fire for a determined period of time. When selecting fuel, there is one key rule – it must be dry.

The driest wood is found high up, away from water sources and on south-facing hillsides with open exposure to the sun. Avoid collecting fire-starting material from the ground, as it may be very damp—especially during wet

weather. Gather dead, dry vegetation from standing trees and plants. Be sure to collect enough fuel to sustain the fire for the duration it is required.

**Tinder.** Tinder is any kind of material that takes the minimum of heat to light. Good tinder needs only a spark to ignite. Tinder can be:

- bat droppings;
- birch bark;
- cotton fluff;
- dried fungi;
- dried grasses;
- dryer lint;
- fine wood shavings;
- pine needles;
- the insides of a bird's nest; or
- waxed paper.



Material used for tinder must be dry.

It is always a good idea to carry some tinder in a waterproof container when going into the field.

**Kindling.** Kindling is the next type of fuel required to raise the flames from the tinder so that larger and less combustible materials can be burned. The best kindling is composed of tiny twigs or slivers that range from the thickness of a pencil lead to that of a pencil itself. The softer woods are preferable because they flare up quickly.

In the case of wet weather or if experiencing difficulty establishing a fire, “feather sticks” can be made (see Figure 5). Feather sticks increase the chance of catching the fuel on fire because they are thinner.

Follow these steps to build a feather stick.

- Find a small dry stick.
- Slice partial shavings leaving the shaving attached to the stick.
- Shave using small thin cuts.



Figure 5 Feather Sticks

A-CR-CCP-107/PT-001 (p. 3-20)

**Wood Fuel.** Wood fuel is thicker and longer than kindling – from pencil to wrist size in diameter. This wood allows a cadet to build a stronger fire that eventually will be able to burn bulk firewood.

**Bulk Firewood.** Bulk firewood is too-big-to-break fuel that is added to a fire only after the fire is burning well. This wood does not necessarily have to be dry. By the time kindling and wood fuel are burning well, the fire should be hot enough to burn even green and damp wood.

## TYPES OF FIRE



Making use of one of the constructed fires, explain to the cadets the type of fuel that is required. Break down the materials displaying tinder, kindling, wood fuel and bulk firewood.

Point out what can be used as tinder. It is especially important to be able to locate dry tinder in a wet environment.

There are many different structural forms for a fire. When building a fire, construct it from the ground up, with room for air to enter. Build it loose with spaces between sticks and wood, allowing it to burn freely.

**Tepee Fire.** This is one of the most convenient configurations for a fire; it is made with kindling on its end forming a cone. This fire starts easily, burns efficiently, and throws out large quantities of heat and light. Furthermore, most of the smoke and sparks are channelled straight up. The slanting walls and resulting high flames help the fire hold up even in rain and snowstorms.

Follow these steps to build a tepee fire:

1. Line the ground or fire pit with dried bark or grass to prevent moisture from wicking into the fuel.
2. Make a small cone out of the kindling by propping the smallest sticks against one another, tepee fashion.
3. Leave enough room between the twigs for air to get through and leave an opening to apply the tinder inside.
4. Face the opening toward the wind to help drive the flames up through the fuel.
5. As the fire lights, add thicker sticks until the fire can maintain itself for short periods of time.

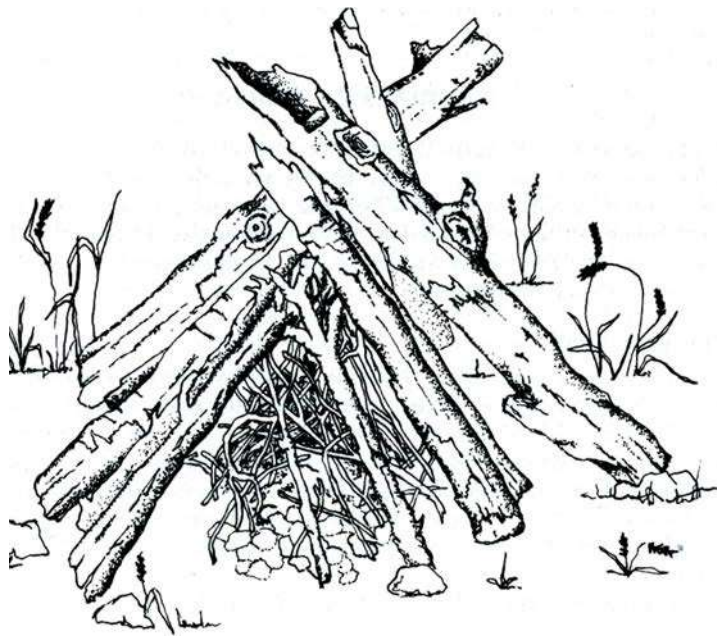


Figure 6 Tepee Fire

*Brown, T., Jr. and Morgan, B., Tom Brown's Field Guide: Wilderness Survival, The Berkley Publishing Group (p. 65)*

**Crossbed Fire.** This fire is good if a bed of hot coals for cooking is required. When lit, the whole structure will burn rapidly, leaving a bed of hot coals, excellent for roasting meat or fish.

Follow these steps to build a crossbed fire:

1. Lay two sticks about a foot apart.
2. Place tinder between the two sticks.
3. Place a layer of fuel at right angles to the original two sticks.
4. Leave space between the pieces.
5. Build up several layers in the same fashion, leaving air spaces.
6. Place each layer at right angles to the layer before it.
7. Light the tinder.

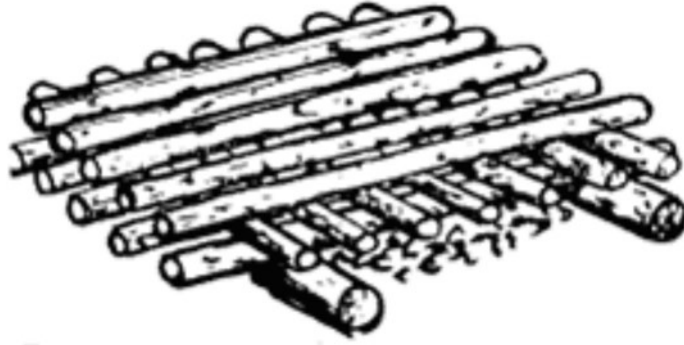


Figure 7 Crossbed Fire

*A-CR-CCP-107/PT-001 (p. 3-19)*

**Crisscross Fire/pyramid.** This fire burns from the top downward. It is useful when going to sleep for the night, as it requires little attention and burns slowly.

Follow these steps to build a crisscross/pyramid fire:

1. Place two small logs or branches parallel on the ground.
2. Place a solid layer of small logs across the parallel logs.
3. Add three or four more layers of logs or branches,
4. Each layer shall be smaller and laid at right angles to the layer below it.
5. Make a starter fire on top of the crisscross/pyramid fire.
6. As the fire burns it will ignite the logs below it.

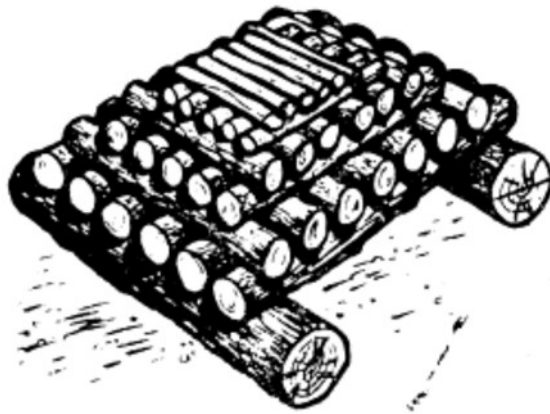


Figure 8 Crisscross/Pyramid Fire

*A-CR-CCP-107/PT-001 (p. 3-20)*

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## CONFIRMATION OF TEACHING POINT 2

### QUESTIONS

- Q1. What elements make up the fire triangle?
- Q2. If air is removed from the fire triangle, what happens to the fire?
- Q3. Name three types of fire.

### ANTICIPATED ANSWERS

- A1. The elements that make up the fire triangle are air, fuel and heat.
- A2. The fire will go out.
- A3. Three types of fires are the tepee, crossbed and crisscross/pyramid.

---

### Teaching Point 3

### Demonstrate Preparing, Lighting, Maintaining and Extinguishing a Fire

Time: 10 min

Method: Demonstration

---



Conduct this TP as a demonstration of lighting a fire. Go through the steps of preparing, lighting, maintaining and extinguishing a fire.

### PREPARING A FIRE

To prepare a fire, build it step by step. Start by laying out fuel in organized piles of kindling, tinder and larger burnable fuels by:

1. **Preparing Tinder.** Place a small handful of tinder in the selected location.
2. **Preparing Kindling.** Place kindling in a style that suits the type of fire that is being constructed (e.g. tepee style).
3. **Preparing Fuel.** Have wood fuel prepared to apply to the fire once it is established. Adding larger fuel may smother the fire if the fire is not ready to burn larger fuel.
4. **Ensuring Ventilation.** Allow for air to reach the kindling and tinder. Do not apply too much fuel at once as the fire may be starved of air prior to ignition. Air should naturally be able to flow, without additional assistance, to encourage growth of the fire.

### LIGHTING A FIRE

To light a fire using a match, light the kindling and monitor the fire. Apply more kindling as required to maintain a burning fire.

### MAINTAINING A FIRE

Maintaining a fire requires a constant source of fuel. Fuel that maintains a fire is usually of larger material considered to be bulk firewood. This fuel will not be consumed by the fire very quickly. It will continue to burn for long periods of time.

When maintaining a fire:

1. **Apply Fuel.** Once the fire has a strong base of hot coals, (coals are red hot) apply bulk fire wood.



Figure 9 Fire With Developed Coals

*Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 433)*

2. **Ensure Ventilation.** Applying bulk firewood may smother the fire. Place bulk firewood so air is able to circulate. Bulk firewood can be placed in any of the fire types (tepee, crossbed, or crisscross/pyramid) by laying the log with one end into the centre of the fire and the other end extending out to the edge of the fire. Continue this process around the fire. Leave spaces between the bulk firewood for air to circulate.

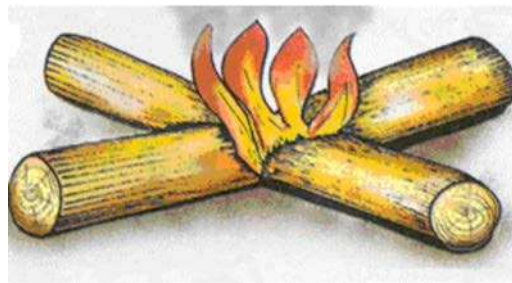


Figure 10 Star Fire

*Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 433)*

3. **Maintain Fire Size.** Fires can easily be over fuelled. To maintain the correct size, limit the amount of fuel used until desired size and warmth is achieved. If the fire is for cooking, hot coals and less fuel is sufficient.

## EXTINGUISH A FIRE

As the fire burns, plan ahead to extinguish it. Stop feeding the fire long before (time enough to let the remaining fuel burn off) it must be extinguished. Collect and pile the remaining chunks of burning wood so they are consumed by the flames, leaving only ashes and coals to dispose of when the fire has finished burning.

Once the fire has burned itself down to white ash, douse it thoroughly with water. Pour water over the ashes, stirring them occasionally to ensure the coals are completely extinguished. Replace or fill the fire pit with wet earth or sand to ensure no flare ups will occur.

If this is a new campfire site, scatter the ashes and replace the sod or decomposing material from the forest floor, returning the site to its original condition.



---

**CONFIRMATION OF TEACHING POINT 3****QUESTIONS**

- Q1. What are the two types of fuel used to start a fire?
- Q2. If it is hard to start a fire or the fuel is wet, what can you do to a stick to increase the chances of it catching fire?
- Q3. How do you extinguish a fire?

**ANTICIPATED ANSWERS**

- A1. Tinder and kindling.
- A2. You can make a feather stick.
- A3. Once the fire has burned itself down to white ash, douse it thoroughly with water. Pour water over the ashes, stirring them occasionally to ensure that they are completely extinguished. Replace or fill the fire pit with wet earth or sand to ensure no flare ups occur.

---

**Teaching Point 4****Prepare, Light, Maintain and Extinguish a Fire**

Time: 50 min

Method: Practical Activity

---

**ACTIVITY****OBJECTIVE**

The objective of this activity is to allow cadets to practice preparing, lighting, maintaining and extinguishing a fire.

**RESOURCES**

Matches.

**ACTIVITY LAYOUT**

N/A.

**ACTIVITY INSTRUCTIONS**

1. Divide cadets into groups of four.
2. Assign each group a type of fire to construct.
3. Fires shall be constructed and lit within 20 minutes.
4. Each fire must be maintained for 10 minutes.
5. All fires must be extinguished, ensuring no smouldering coals are present.
6. Ensure fire sites are cleaned up and returned to their original state within 20 minutes.

**SAFETY**

Supervisory staff shall have fire safety equipment available in case of an emergency.

---

**CONFIRMATION OF TEACHING POINT 4**

The cadets' participation in the activity in TP4 will serve as the confirmation of this TP.

---

**END OF LESSON CONFIRMATION**

The cadets' participation in the activity in TP4 will serve as the confirmation of this lesson.

---

**CONCLUSION**

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**HOMEWORK/READING/PRACTICE**

N/A.

**METHOD OF EVALUATION**

N/A.

**CLOSING STATEMENT**

Cadets, having learned to prepare, light, maintain and extinguish a fire can now construct the type of fire to meet their needs. Emergency situations present constantly changing conditions. The ability to construct a specific fire is essential to increasing the chances of survival.

**INSTRUCTOR NOTES/REMARKS**

N/A.

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## ROYAL CANADIAN ARMY CADETS

### RED STAR

### INSTRUCTIONAL GUIDE



### SECTION 6

### EO M224.06 – IDENTIFY METHODS OF SIGNALLING

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-702/PG-001, Chapter 4 of. 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.

Prepare a ground-to-air message signal for cadets to see as a visual aid.

Permission will be obtained for a signal fire from the local authorities (e.g. local police, forestry service, and/or airport authority). The following information will be provided:

1. the organization;
2. a contact name;
3. a contact number;
4. the location including grid reference (GR);
5. the estimated time of lighting; and
6. the duration the fire is expected to be lit.

#### PRE-LESSON ASSIGNMENT

N/A.

#### APPROACH

An interactive lecture was chosen for TP1 and TP2 to introduce and allow the cadets an opportunity to practice signalling methods.

A practical activity was chosen for TP3 as it is an interactive way to introduce cadets to methods of signalling. This activity contributes to the development of survival skills in a fun and challenging setting.

### INTRODUCTION

#### REVIEW

N/A.

## OBJECTIVES

By the end of this lesson the cadet shall be expected to identify methods of signalling.

## IMPORTANCE

It is important for cadets to know how to signal for help so they can increase their chances of being located more quickly, if they become lost.

---

### Teaching Point 1

### Discuss Signalling Devices

Time: 10 min

Method: Interactive Lecture

---



This TP focuses on signalling devices that can be used in the field. Ask the cadets if they know of anyone who was lost and was found through the use of a signalling device.

Discuss the way in which the individual signalled for help. Point out any key reasons why the individual was found because of the signal.

If there is no story provided by the cadets, a story has been provided below. Read the story and have the cadets brainstorm for a moment and ask them what they think Dave can use to signal for help.

Keep in mind the cadets have no idea what materials Dave has or what he brought with him. Assume he has everything and get the cadets to think about what can be used to signal search and rescuers.

Continue with the TP, describing the signals and how they can be employed.

### Survival Story

It is a beautiful summer day and Dave decides to go for a hike. Before leaving his house he writes a note to his wife saying where he is going and that he expects to be back by suppertime (1700hrs).

Leaving his home and arriving at the base of his normal hiking trails he decides to take a new route that he has never travelled before. The hiking trails in this area are usually safe and easy. The trails are always marked and the route is easy to follow. As the day wears on, Dave finds he is running a little behind on his timings and decides to speed up his pace.

Cutting across some rough, rocky ground, Dave suddenly loses his footing, jams his foot between two rocks and falls over. Hearing a loud snap and feeling a sudden rush of pain spreading up from his ankle, Dave realizes he has broken his ankle.

After freeing himself and splinting his ankle, Dave knows he will not be able to walk out of the woods. Preparing for a night in the woods, Dave applies the S.T.O.P. principles and thinks about the five elements of survival. Dave finds a natural, tree hollow shelter suitable for a night's stay in the field. Dave knows his wife will send for help. However, he is not on his normal hiking routes.

Determining that he may have to signal for help, he begins to think about what options he has.

### SIGNALLING

Signalling for help is essential for increasing the chances of being located quickly. Establishing contact with, or attracting the attention of search and rescuers should be the main objective after all vital survival needs have been addressed.

When preparing signals keep the following points in mind.

- Be sure to have signals ready and place them in open areas that are readily seen from the ground and the air.
- Prepare as many types of signals as possible.
- Protect signals and equipment from moisture and cold.
- Any unusual sign or colour contrast is visible from the air, even a trail in the snow.
- Care for all signalling equipment to prolong its use.

## SIGNALLING DEVICES

**Flares.** Flares are small rockets that ascend to a high altitude of approximately 45-60 metres and burn for approximately 7-15 seconds. The flare emits a single Red Star. This bright light can be seen for many miles depending on the weather. When choosing a signal flare, be sure to try to deploy it from an elevated position where no obstructions exist overhead.

**Mirrors.** Mirrors can reflect sunlight beyond the horizon up to seven million candlepower. Hold the mirror in your hand with your arm outstretched. Sight along your arm to aim the mirror, flash at particular points along the horizon. Send three flashes.

**Whistles.** Whistles emit a loud piercing sound. They are designed to be heard above ambient noise, the roar of engines, breaking waves and gale force winds. Blowing a whistle three times in succession, signals anyone who hears this that someone requires help.



A series of three signals (whistles, flashes, etc.) in a row represents the universal distress call. It is similar to the S.O.S. morse code signal.

**Radios and Cell Phones.** These items can provide a direct link to help immediately. Location may hinder or completely restrict a signal. Move to higher ground that is close by and attempt an emergency call again. Communications dealing with distress, urgency, or safety have priority over other radio traffic. Identify who is calling, speak clearly and keep communications as brief as possible. Arrange a check in time and turn off the phone to save battery life in emergency situations.

**Fire and Smoke.** Fire and smoke can be used to attract the attention of search and rescuers. Three evenly spaced fires, 35 metres or 100 feet apart, arranged in a triangle or in a straight line, serve as an international distress signal. One signal fire will usually work. During the night, the flames should be as bright as possible and during the day, the fire should produce as much smoke as possible.

---

## CONFIRMATION OF TEACHING POINT 1

### QUESTIONS

- Q1. What are three points you should keep in mind when preparing signals?
- Q2. Name five signalling devices.
- Q3. If you found yourself lost in the woods what could produce a very loud piercing sound to signal that you are in trouble?

## ANTICIPATED ANSWERS

A1. Any of the following:

- Be sure to have signals ready and place them in open areas that are readily seen from the ground and the air.
- Prepare as many types of signals as possible.
- Protect signals and equipment from moisture and cold.
- Any unusual sign or colour contrast is visible from the air, even a trail in the snow.
- Care for all signalling equipment to prolong its use.

A2. Five signalling devices are:

- Flares.
- Mirrors.
- Whistles.
- Radios and cell phones.
- Fire and smoke.

A3. A whistle could produce a very loud piercing sound.

---

### Teaching Point 2

### Discuss Ground-to-air Signals Employed to Communicate With Aircraft

Time: 15 min

Method: Interactive Lecture

---



Start this lesson by showing the cadets the previously prepared ground-to-air signal. While instructing this TP, refer to aspects of the prepared signal as a visual aid.

Orient the signal to take advantage of the sun and the casting of a shadow. Making use of shadows will greatly enhance the signal. Reinforce the importance of having a correctly oriented and developed signal.

Typically, when a person becomes lost a search will commence around the last known position. These parameters will expand when nothing is found along the intended route. Searchers will be looking for anything out of the ordinary and their eyes will be drawn to unnatural features of the ground. Make the site as conspicuous as possible by preparing ground-to-air signals.

### SIGNAL DIMENSIONS

A signal should be as large as possible. To be the most effective, the signal should have lines no less than 1 m wide (3 feet) and 8 m long (26 feet). Care should be taken to ensure symbols are laid out exactly as depicted. From the air, symbols will appear close together as altitude increases. Ensure each symbol is at least 3 m apart (10 feet).

## CONTRASTING SHADES OR COLOURS



Illustrating and defining a shadow created from a ground-to-air signal may be difficult.

Ensure that the signal is parallel to the sun's direction of travel (e.g. east to west) and be sure to make the signal large enough to produce a shadow.

A signal should stand out sharply against its background. This helps to make the signal appear larger. Everything must be done to disturb the natural look of the ground. This can be accomplished by:

- stamping down grass or turning it over to allow the signal to be easily seen from the air;
- burning a pattern in the grass;
- trampling out a signal in the snow, using only one path to and from the signal; and
- considering the shadow created by the sun and maximizing the shadow created by stamped foot markings or snow piles.



The signal should be located so it can be seen from all directions. Make sure the signal is located away from shadows and overhangs. A large, high, open area is preferable.

## GROUND-TO-AIR SIGNALS

The following symbols are to be used to communicate with aircraft when an emergency exists. Symbols 1 to 5 are internationally accepted; 6 to 9 are for use in Canada only.

NO.	MESSAGE	CORE SYMBOL
1.	Require Assistance	V
2.	Require Medical Assistance	X
3.	No or Negative	N
4.	Yes or Affirmative	Y
5.	Proceeding In This Direction	↑
6.	All Is Well	LL
7.	Require Food and Water	F
8.	Require Fuel and Oil	L
9.	Need Repairs	W

Figure 1 Ground-to-Air Signals

*D Cds 3, 2007, Ottawa, ON: Department of National Defence*

## CONFIRMATION OF TEACHING POINT 2

### QUESTIONS

- Q1. What should the dimensions of a ground-to-air signal be?
- Q2. If you were asked to make the symbol V on the ground, what would it mean to an aircraft above?
- Q3. How does one create a contrasting shade on the ground?

## ANTICIPATED ANSWERS

A1. A ground-to-air signal should be 1 m wide by 8 m long.

A2. The symbol V means someone requires assistance.

A3. To create a contrasting shade on the ground:

- stamp down grass or turn it over to allow the signal to be easily seen from the air;
- burn a pattern in the grass;
- tramp out a signal in the snow, using only one path to and from the signal; and
- consider the shadow created by the sun and maximize the shadow created by stamped foot markings or snow piles.

---

### Teaching Point 3

### Construct a Ground-to-air Signal

Time: 25 min

Method: Practical Activity

---

## ACTIVITY

### OBJECTIVE

The objective of this activity is to construct a ground-to-air signal capable of being seen from aircraft.

### RESOURCES

Objects and debris from the surrounding environment.

### ACTIVITY LAYOUT

N/A.

### ACTIVITY INSTRUCTIONS

- Divide the cadets into groups of no more than four.
- Assign the groups one of the five ground-to-air signals to construct.
- Give the cadets 20 minutes to seek out materials and create their signal.
- Upon completion, inspect the signals and confirm they meet the dimensions.
- Disassemble all signals and return materials to original locations.

### SAFETY

Establish boundaries for the cadets who are gathering materials.

---

### CONFIRMATION OF TEACHING POINT 3

The cadets' participation in this activity will serve as the confirmation of this TP.



---

**END OF LESSON CONFIRMATION**

The cadets' participation in the activity in TP3 will serve as the confirmation of this lesson.

---

**CONCLUSION**

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**HOMework/READING/PRACTICE**

N/A.

**METHOD OF EVALUATION**

N/A.

**CLOSING STATEMENT**

Signals provide a cadet in distress with the means to gain the attention of search and rescuers. Cadets who become lost can employ the actions to take when lost through completing the S.T.O.P. acronym and include in their plans a method of signalling for help.

**INSTRUCTOR NOTES/REMARKS**

N/A.

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**REFERENCES**

---

C2-016 (ISBN 0-517-88783-5) Curtis, R. (1998). *The Backpacker's Field Manual: A Comprehensive Guide to Mastering Backcountry Skills*. New York, NY: Three Rivers Press.

C2-044 Department of Transportation. (2007). *Ground-to-Air Signals*. Retrieved 9 February 2007, from <http://www.tc.gc.ca/CivilAviation/publications/tp14371/SAS/4-0.htm>.

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## ROYAL CANADIAN ARMY CADETS

### RED STAR

### INSTRUCTIONAL GUIDE



### SECTION 7

### EO C224.01 – COOK IN THE FIELD

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-702/PG-001, 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.

From EO M224.05 (Prepare, Light, Maintain, and Extinguish a Fire), review:

- choosing a safe fire site;
- preparing a fire;
- lighting a fire;
- maintaining a fire; and
- extinguishing a fire.

#### PRE-LESSON ASSIGNMENT

N/A.

#### APPROACH

An interactive lecture was chosen for TP1 to introduce cooking in the field and to present basic or background material.

A practical activity was chosen for TP2 as it is an interactive way to introduce cadets to cooking in the field. This activity contributes to the development of survival skills in a fun and challenging setting.

### INTRODUCTION

#### REVIEW

The review for this lesson is from EO M224.05 (Prepare, Light, Maintain, and Extinguish a Fire).

## QUESTIONS

- Q1. What does a fire need in order to burn?
- Q2. How is a fire lit?
- Q3. How can a fire be extinguished?

## ANTICIPATED ANSWERS

- A1. In order to burn, a fire needs air (oxygen), fuel and heat.
- A2. To light a fire using a match, light the kindling and monitor it.
- A3. To extinguish a fire one can stop feeding it, cover it with wet earth or douse it thoroughly with water.

## OBJECTIVES

By the end of this lesson the cadet shall be expected to cook in the field.

## IMPORTANCE

It is important for cadets to know different ways to cook and prepare meals in the field. In a survival situation, it is extremely important to be familiar with different cooking options. Having the confidence to use these methods to cook food will help a cadet get nutrition and energy when they are needed.

---

### Teaching Point 1

### Discuss Methods for Cooking in the Field

Time: 15 min

Method: Interactive Lecture

---



All of the methods listed require prior preparation of the food being cooked. This involves peeling/skinning, cleaning and wrapping. When cooking in the field, food must be properly prepared. Cadets will prepare a potato for baking in TP2. Preparing other foods (e.g. meat, such as rabbits) will be discussed in Silver Star.

Cooking in the field is an important skill for people who find themselves in a survival situation. Since the human body needs nutrients and energy, cooking is essential. There are many different ways to cook in the field.

## BAKING IN A SHALLOW PIT LINED WITH ROCKS

The best way to bake in the field is in the ground. When food is buried, it will cook faster. To do this:

1. Dig a shallow pit in the ground.
2. Line the pit with rocks.
3. Burn a small fire to get a bed of coals.
4. Place a layer of wet grass on the embers when there are no more open flames and only hot, red embers remaining (if the grass is dry, soak in water).
5. Place the food (already prepared to be cooked) on top of the wet grass.
6. Use a stick to move around the hot coals to get them as close to the food as possible. Try to put some coals on top of the food.
7. Cover the food with the earth that was dug from the pit.

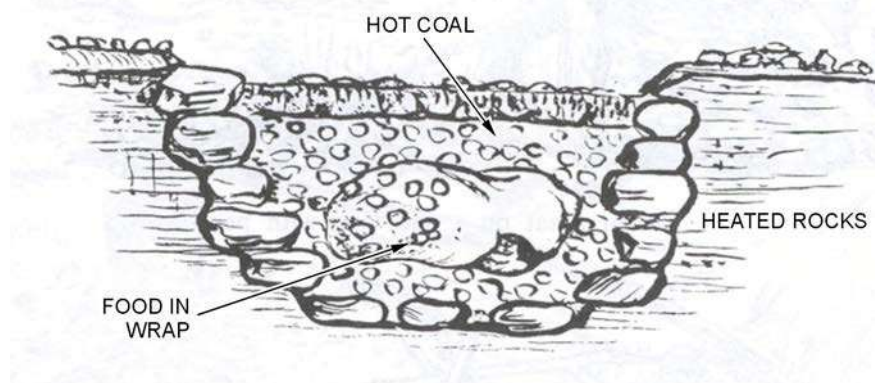


Figure 1 Baking in the Ground

*B-GA-217-001/PT-001, Down But Not Out (p.130)*



When using this method, it is very difficult to check and see if the food is cooked. Cooking time will vary, depending on what is being cooked. Ensure food is completely cooked before consuming. Place it back in the ground and allow more time if unsure.

### ROASTING WITH A STICK

Roasting is an easy method that produces tasty results. Unfortunately, it also produces a lot of grease when cooking meat. To minimize waste, place a pot or container under the roasting food to catch grease. Place the object being cooked on the end of a stick, beside an open fire. The food should not be placed directly over the fire and direct contact with smoke and flame should be avoided as much as possible.

The food will need to be rotated or turned to ensure it is cooked throughout. If dangling the object, a rotor, made with plastic or heavy paper, can be attached (see Figure 3). The rotor will catch and turn in the wind, turning the food.

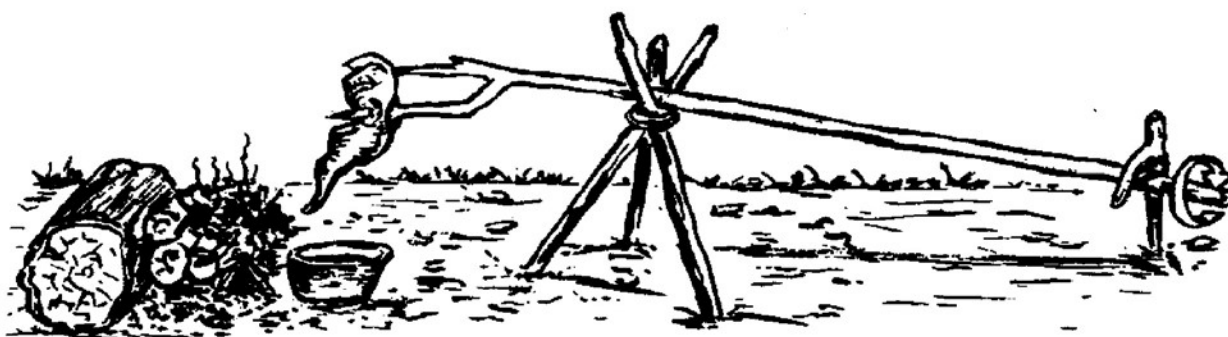


Figure 2 Roasting

*B-GA-217-001/PT-001 (p.129)*

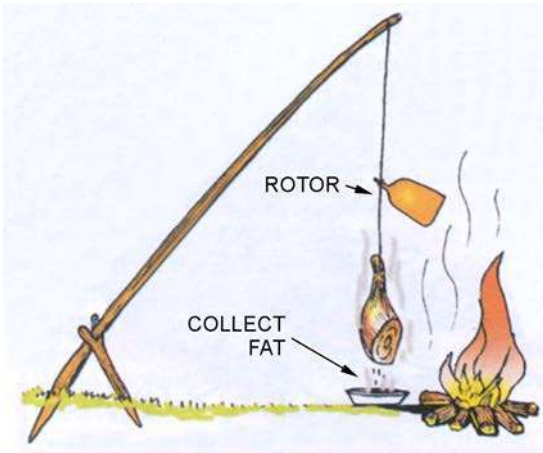


Figure 3 Roasting With a Rotor

*Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 442)*

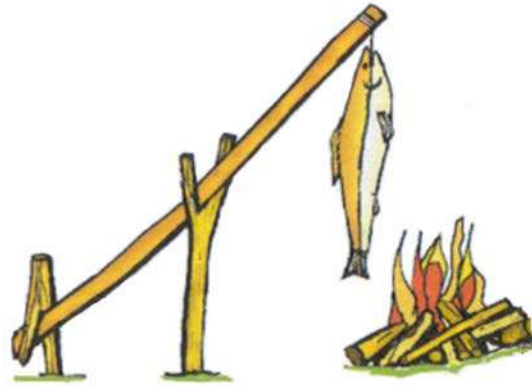
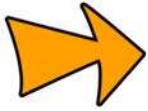


Figure 4 Roasting Fish

*Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 448)*

## BOILING IN A POT

Boiling in a pot can be done over an open fire, the same as on a stove. When boiling in a pot, ensure the pot is sitting straight up on the fire. This can be done by using a grill, wedging it between two pieces of thick wood or placing rocks around to stabilize it. There are many ways to place a pot over a fire using wood (see Figures 5 to 8). It is important to ensure the pot is stable and does not have a risk of falling into the fire.



Seeing bubbles is an easy way to tell that water is boiling.



Boiling over an open fire will normally cause soot to form on the outside of the pot. A coating of soapy water on the outside of the pot will make cleaning much easier.

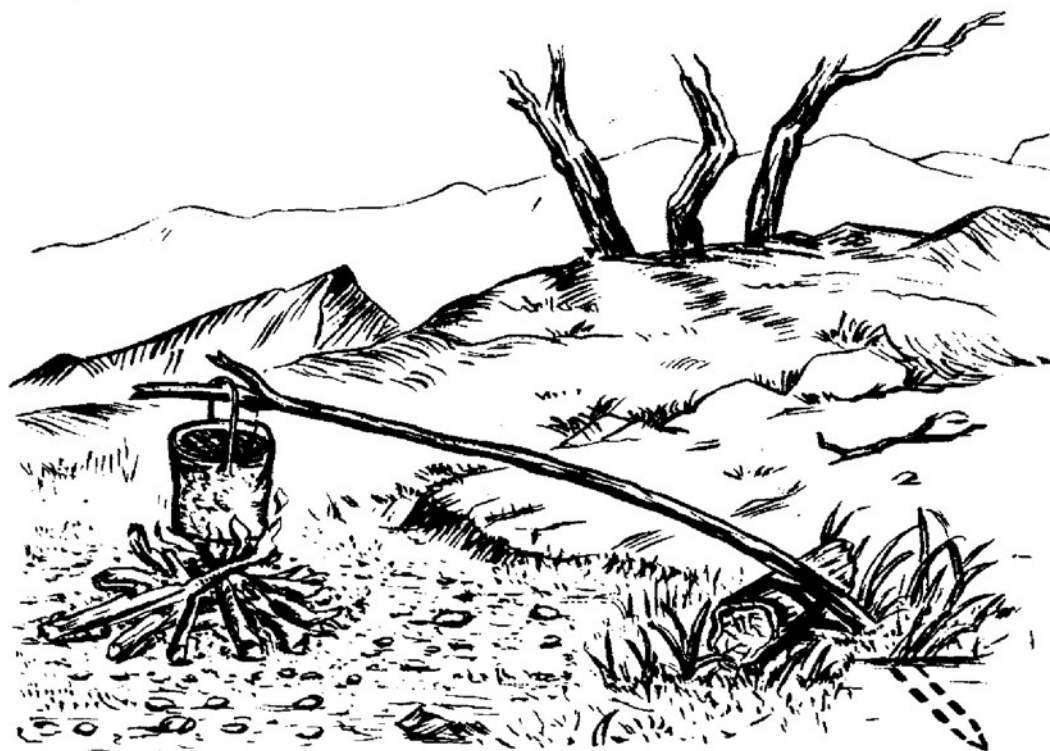


Figure 5 Boiling

*B-GA-217-000/PT-001 (p.128)*

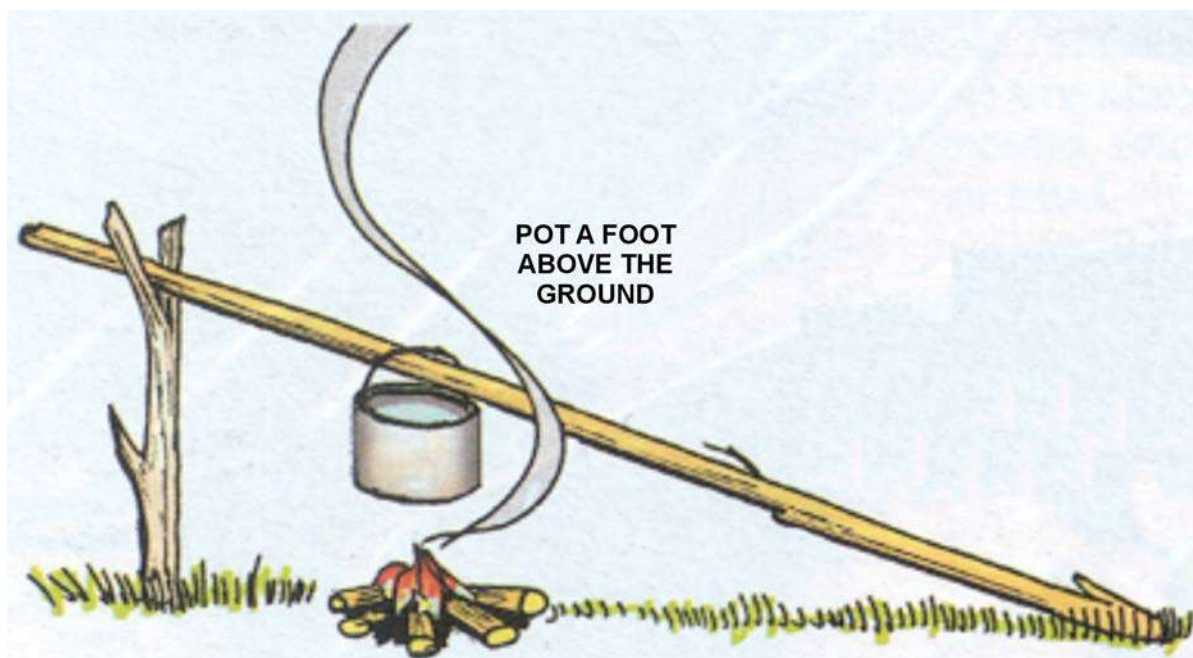


Figure 6 Boiling

*Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 442)*

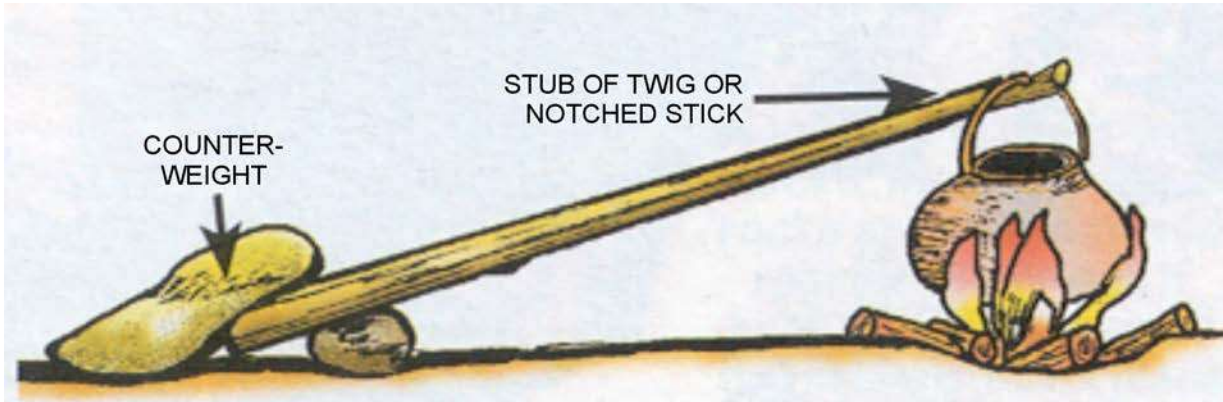


Figure 7 Boiling Using a Counterweight

*Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 442)*

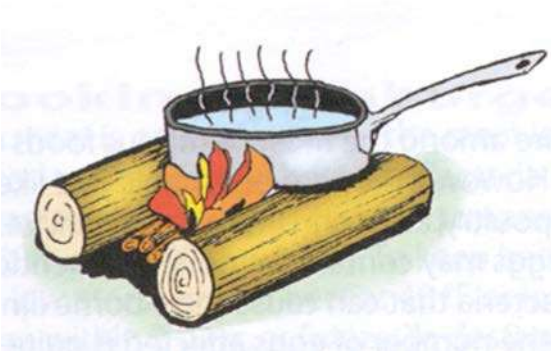


Figure 8 Boiling on an Open Flame With Wood

*Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 444)*

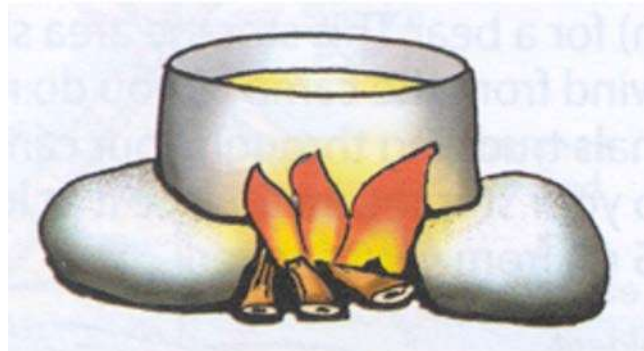


Figure 9 Boiling on an Open Flame With Rocks

*Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 442)*

## FRYING

Food can be easily fried on a rock or sheet of metal. A rock will hold a lot of heat for a very long time. When using this method to cook, food may easily stick if there is not a sufficient amount of grease.



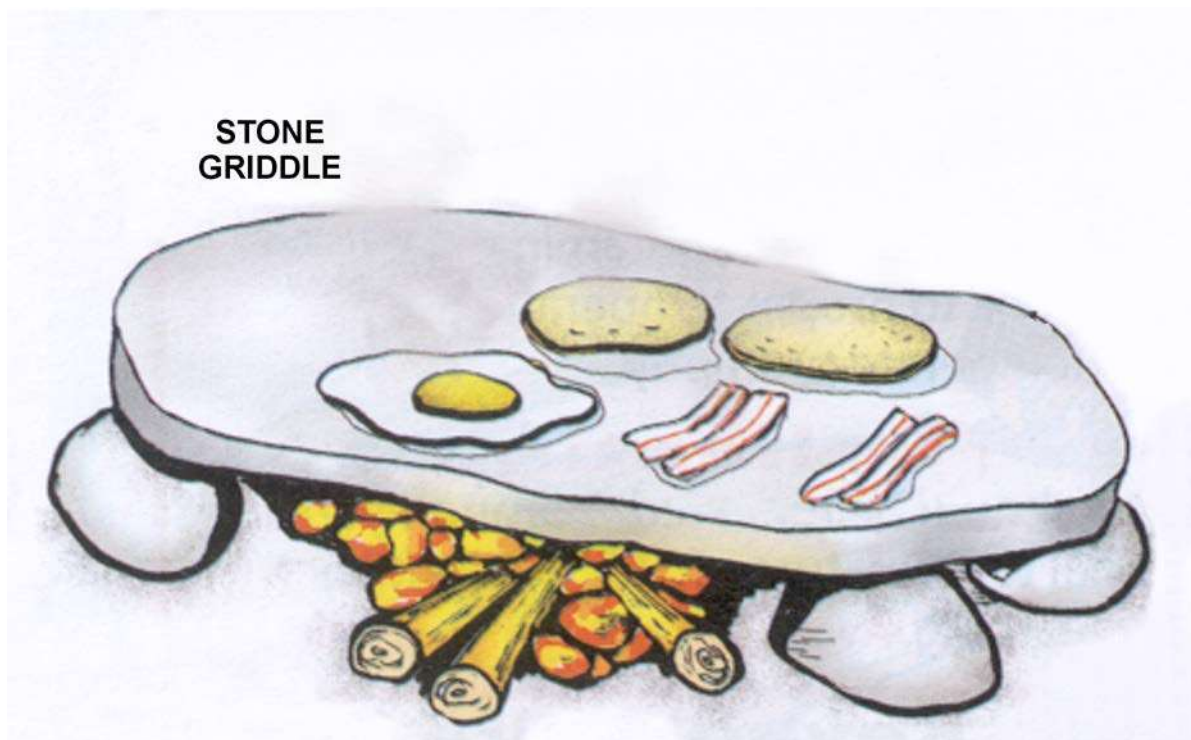


Figure 10 Frying on a Flat Rock

Tawrell, P., *Camping and Wilderness Survival*, Leonard Paul Tawrell (p. 442)

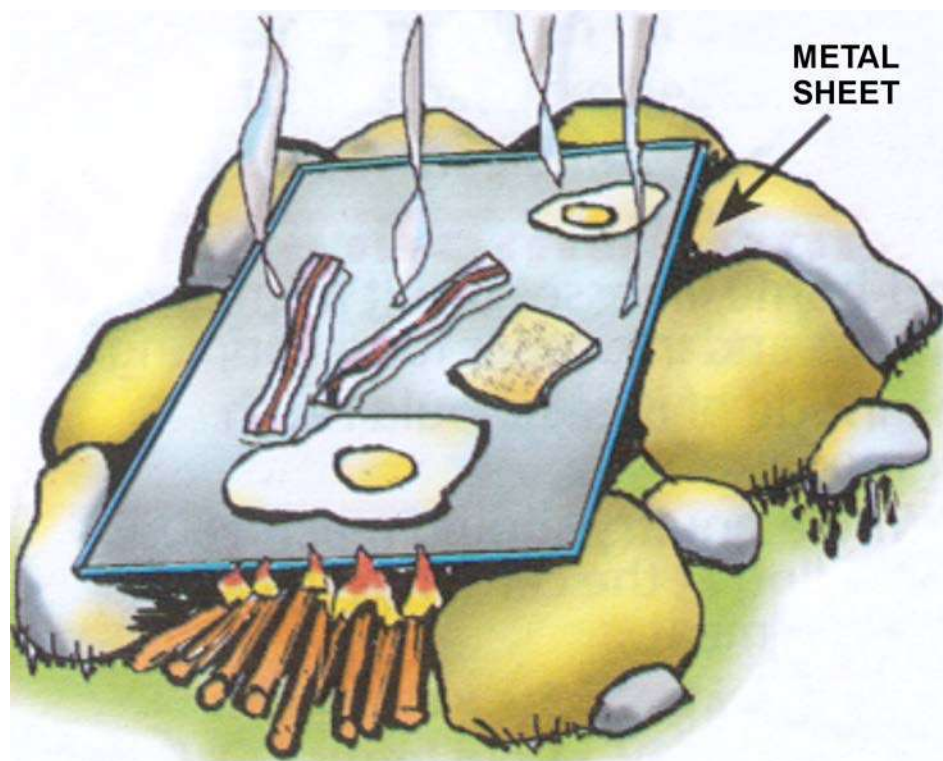


Figure 11 Frying With a Metal Sheet

Tawrell, P., *Camping and Wilderness Survival*, Leonard Paul Tawrell (p. 442)

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## CONFIRMATION OF TEACHING POINT 1

### QUESTIONS

- Q1. What are some methods for cooking in the field?
- Q2. Why is it important to make sure that a pot is stable when boiling?
- Q3. What is a disadvantage of frying?

### ANTICIPATED ANSWERS

- A1. Some methods for cooking in the field are baking, roasting, boiling and frying.
- A2. It is important that the pot is stable so that it does not fall into the fire.
- A3. A disadvantage of frying is that food will probably stick to the cooking surface if there is not enough grease.

---

## Teaching Point 2

## Prepare and Bake a Potato in the Ground

Time: 35 min

Method: Practical Activity



Any food being cooked must be prepared first. Cadets will prepare a potato for baking in the ground.

Ensure that fires are small, since they must be extinguished before baking occurs.

Once the potatoes are placed in the ground, they will take approximately 30 minutes to cook. The cadets will have to come back after this lesson to retrieve their potato.

All fire pits should be marked to ensure no pit is forgotten.

---

## ACTIVITY

### OBJECTIVE

The objective of this activity is to prepare and bake a potato in the ground.

### RESOURCES

- Water;
- Potato;
- Tin foil;
- Matches; and
- Shovels.

### ACTIVITY LAYOUT

This activity must take place in a large open area, with enough room for each group of cadets to cook a potato in the ground.

## ACTIVITY INSTRUCTIONS

1. To prepare the potatoes:
  - a. Distribute one potato to each cadet.
  - b. Have each cadet wash and scrub their potato with water.
  - c. Have each cadet wrap their potato in tin foil. All potatoes should be completely wrapped at least three times in the tin foil.
2. Divide the cadets into groups of two to four.
3. Have each group dig a shallow pit in the ground.
4. Line the pit with rocks.
5. Burn a small tepee or crossbed fire to get a bed of coals.
6. Place a layer of wet grass on the embers when there are no more open flames and only hot, red embers remaining (if the grass is dry, use water).
7. Place the wrapped potatoes on top of the wet grass.
8. Use a stick to move around the hot coals to get them as close to the potato as possible, trying to put some coals on top of the potato.
9. Cover the potato with the earth that was dug from the pit.



Some cadets may wish to peel their potato prior to preparing it. A small pocket knife can do this.

If shovels are limited, encourage the cadets to find creative ways to dig the hole (e.g. with hollowed wood or with a spoon).

Cadets may wish to have salt, butter, sour cream, etc. with their potato.

Potatoes will take approximately 30 minutes to cook. Enjoy!

## SAFETY

- Supervisory staff shall have fire safety equipment available in case of emergency.
- Potatoes will be hot, use extreme caution.

---

## CONFIRMATION OF TEACHING POINT 2

The cadets' participation in the activity will serve as the confirmation of this TP.

---

## END OF LESSON CONFIRMATION

The cadets' participation in baking a potato in the ground will serve as the confirmation of this lesson.

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## CONCLUSION

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### HOMEWORK/READING/PRACTICE

N/A.

### METHOD OF EVALUATION

N/A.

### CLOSING STATEMENT

Knowing how to cook in the field is a great skill to have when lost. Knowing the many different ways to cook in the field could mean the difference in a person making it through a survival situation. Being able to use different methods of cooking in the field is also a fun way to cook food when on a weekend bivouac FTX.

### INSTRUCTOR NOTES/REMARKS

The construction of fire pits requires additional supervision and the availability of fire safety equipment. Fire pits are to be marked with flags and must be supervised while baking is in progress.

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## REFERENCES

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A2-046 B-GA-217-001/PT-001 *Down But Not Out*. (ND). Ottawa, ON: Department of National Defence.

C0-111 (ISBN 0-9740820-2-3) Tawrell, P. (2006). *Camping and Wilderness Survival: The Ultimate Outdoors Book* (2<sup>nd</sup> ed.). Lebanon, NH: Leonard Paul Tawrell.



## ROYAL CANADIAN ARMY CADETS

### RED STAR

### INSTRUCTIONAL GUIDE



### SECTION 8

### EO C224.02 – PREPARE A SIGNAL FIRE

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-702/PG-001, 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.

Prior to conducting this lesson, prepare the following:

- a three fire triangle;
- a torch tree; and
- a luminous cone fire.

Instructors will only demonstrate lighting the first of the prepared signal fires.

Additional supervision is required during the lighting of the signal fires. Fire safety equipment shall also be present.

The fire index is to be checked and appropriate authorities (e.g. local police, forestry service, and/or airport authority) shall be notified of the lighting of the signal fires. Authorities will be provided with the following information:

- corps contact name;
- contact number;
- location including grid reference;
- estimated time of lighting; and
- the duration the fire is expected to be lit.



Some localities may require the issue of special permission to conduct open/signal fires. Be sure permission is granted by the appropriate authorities listed above.

## PRE-LESSON ASSIGNMENT

N/A.

## APPROACH

An interactive lecture was chosen for TP1 and TP2 to introduce the types of signal fires and to identify locations to prepare signal fires.

Demonstration was chosen for TP3 as it allows the instructor to explain or demonstrate preparing a signal fire.

A practical activity was chosen for TP4 as it is an interactive way to allow cadets to prepare a signal fire and witness the lighting of the signal fire in a safe and controlled environment.

---

## INTRODUCTION

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## REVIEW

The review for this lesson will be from EO M224.05 (Prepare, Light, Maintain, and Extinguish a Fire), to include:

**Selecting and Preparing Kindeer.** Tinder is any kind of material that a minimum amount of heat will ignite. Good tinder is dry and needs only a spark to set it ablaze. Birch bark, dry grass, fine wood shavings, bird down, waxed paper and cotton fluff from clothing all make good tinder. It is a good idea to carry tinder in a waterproof container.

**Selecting and Preparing Kindling.** Kindling is the wood used to raise flames from the tinder so larger, less combustible materials can be burned. The best kindling consists of small, dry twigs and small pieces of softwood. Kindling should not be collected straight from the earth because it is usually damp. It should be gathered from standing deadwood.

**Selecting and Preparing Fuel.** Fuel is anything that will burn in the fire. Dry wood from standing trees should be used to get fires going. Once the fire is established, greener and damp wood may be used. Hardwoods including hickory, beech, maple and oak burn well, give off heat and last as long as hot coals. The fire can be maintained for a long period of time using hardwoods.

Softwoods burn very quickly and give off sparks and can be used when lighting the fire. Softwoods include cedar, alder, hemlock, spruce, pine, chestnut and willow. After the fire is burning steadily, fuel that is three to four times the size of the kindling can be added.

## OBJECTIVES

By the end of this lesson the cadets shall be expected to prepare and light a signal fire.

## IMPORTANCE

It is important for cadets to be able to signal search and rescue services should they become lost during an expedition. One method of signalling, which can identify a cadet's location by air or ground searchers, is the use of signal fires. Signal fires represent an important survival skill that may one day save a cadet's life.

**Teaching Point 1****Determine Types of Emergency Signal Fires**

Time: 5 min

Method: Interactive Lecture



As each signal is discussed, show cadets an example of each. Make sure cadets fully understand how to ignite each fire.

**EMERGENCY SIGNAL FIRES****Three Fire Triangle Pattern**

Three fires is the internationally recognized distress signal. Ideally, they should be placed in a triangle at equal distances apart, an arrangement which also makes them easier to feed with fuel. If this is not possible, any grouping will do, provided the fires are clearly separated. However, if fuel is scarce, or if one is too badly injured to maintain several fires, use only your campfire.

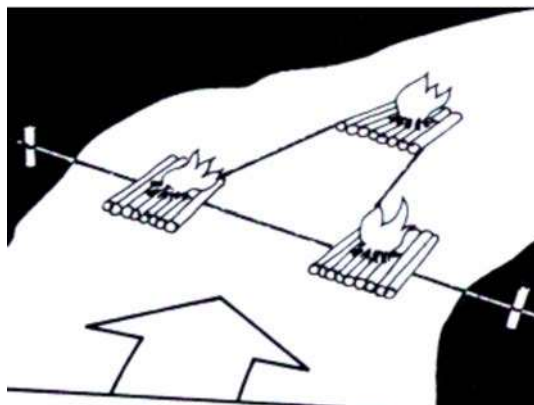


Figure 1 Three Fire Triangle Pattern

*Wiseman, J., The SAS Survival Handbook, HarperCollins Publishers (p. 505)*

**A Torch Tree**

Small isolated trees make excellent fire signals. Build a fire between the boughs by placing dry wood in the lower branches and ignite it so the flames flare up and ignite the foliage. Before the primary tree is consumed, cut and add more small green trees to the fire to produce more smoke. If a tree is dead, start a fire at its base. It will burn for a long time, leaving you free to attend to other signals.



Figure 2 A Torch Tree

*“Signalling Techniques”, by Wilderness Survival. Copyright 2007 by Jalic Inc.  
Retrieved 12 March 2007, from <http://www.wilderness-survival.net/chpt19.php>*



Always select an isolated tree to ignite to avoid starting a forest fire.

### **Luminous Cone Fire**

On a clear and open site, make a tripod with a platform to support a fire. The platform keeps the tinder off damp ground and elevates the fire allowing it to ignite the boughs. Additional fire wood can be stored beneath it. If available, cover the cone with brightly coloured material when the fire is not lit. This will not only keep the fire dry and ready to burn, but the material itself will be noticeable and may attract attention. Remove the brightly coloured material when lighting the fire.

Keep these tripods well maintained, ensuring that wood is dry enough to light at a moment's notice. These fires are not expected to last very long as the tripod is made of wood and wood burns! Be sure to light the signal fire when someone will see it (e.g. when one hears a plane).



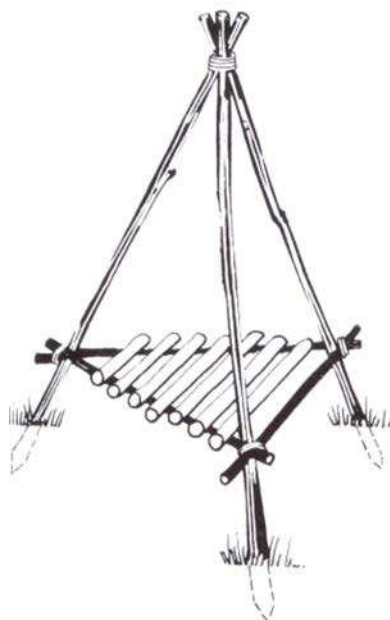


Figure 3 A Luminous Cone Fire

Wiseman, J., *The SAS Survival Handbook*,  
HarperCollins Publishers (p. 506)



Figure 4 Cone Fire

Atlin Community Network Retrieved 12 March 2007,  
from <http://www.atlin.net/Rangers.htm>

## CONFIRMATION OF TEACHING POINT 1

### QUESTIONS

- Q1. Name three types of emergency signal fires.
- Q2. Why is it important to make sure that a pot is stable when boiling?
- Q3. What is an internationally recognized distress signal?

### ANTICIPATED ANSWERS

- A1. They are the three fire triangle pattern, the torch tree, and the luminous cone fire.
- A2. Always select an isolated tree so that you do not start a forest fire and endanger yourself and others.
- A3. An internationally recognized distress signal is three fires.

## Teaching Point 2

## Identify a Location to be Seen From the Air

Time: 5 min

Method: Interactive Lecture

### BEST LOCATIONS FOR A SIGNAL FIRE TO BE SEEN FROM THE AIR

**Elevated Ground.** Choose the highest points of terrain for lighting signals.

**Highly Visible.** Find a natural clearing or the edge of a stream where one can build fires that foliage will not obscure the fire from overhead.

**Fuel Source.** Construct fires in an area where there are readily available fuel sources for the signal fire.

Examples of fuel sources include:

- dry, standing wood, and dry, dead branches;
- dry inside (heart) of fallen tree trunks and branches;
- green wood that is finely split;
- dry grasses twisted into bunches;
- peat dry enough to burn;
- dried animal dung;
- animal fats;
- coal, oil shale, or oil laying on the surface; and
- rubber, plastic or heavy oil to produce thick black smoke.

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## **CONFIRMATION OF TEACHING POINT 2**

### **QUESTIONS**

- Q1. What is the best terrain for the location of a signal fire?
- Q2. What is a highly visible location?
- Q3. What are some examples of fuel sources?

### **ANTICIPATED ANSWERS**

- A1. The highest point of terrain is the best location.
- A2. It is a natural clearing or edge of a stream.
- A3. Some examples of fuel sources are:
- dry, standing wood, and dry, dead branches;
  - dry inside (heart) of fallen tree trunks and branches;
  - green wood that is finely split;
  - dry grasses twisted into bunches;
  - peat dry enough to burn; dried animal dung;
  - coal, oil shale, or oil laying on the surface; and
  - rubber, plastic or heavy oil to produce thick black smoke.

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**Teaching Point 3****Prepare a Signal Fire**

Time: 20 min

Method: Demonstration

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**COMBUSTIBLE MATERIALS**

Examples of combustible materials include birch bark, dry grass, fine wood shavings, bird down, waxed paper and cotton fluff from clothing.



The luminous cone fire that has been previously constructed can act as an example for demonstration purposes.

**CONSTRUCTING A LUMINOUS CONE FIRE**

To construct a luminous cone fire:

1. Locate three 2 m (about 6 feet) sticks about the thickness of an adult's wrist or thicker.
2. Stand sticks on end forming a tepee style structure. Sticks can be driven into the ground to make the structure secure.
3. Sticks should meet at a point leaving approximately 30 cm (1 foot) from the end. This will provide enough room to make a cone of boughs on top of the structure.
4. Lash the tripod together where all sticks meet.
5. Construct a platform approximately 45 cm to 60 cm below the point where the sticks meet.
6. The platform should be made of sticks that are wrist thick so when the fire is lit it will not burn rapidly through.
7. Place kindling and tinder on the platform that will easily light, producing a burst of fire.
8. Cover the top of the tripod with green boughs making a cone shape. The heat from the fire should travel directly into the cone.
9. When lit, tremendous amounts of smoke should be produced.

**MAXIMIZING SIGNAL FIRE SMOKE**

Smoke is a form of visual communication. Creating large amounts of smoke that are dark and can be seen over long distances is very simple. By lighting a fire and adding any of the following fuels, dark smoke will be created.

Smoke-creating fuels:

- leaves;
- green boughs;
- wet/damp wood; and
- rubber.

**Maintaining Smoke.** To maintain smoke, one must constantly cover the fire with fuel that causes smoke. Be cautious not to smother the fire. If green boughs are available, pile many on a fire and the smoke produced will be thick and dense. Boughs burn quickly. Be sure to have many on hand to maintain the smoke level.

Smoke can also be produced by covering the fire for a very short period of time. Covering the fire with a blanket and raising it quickly will produce a puff of smoke.

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### **CONFIRMATION OF TEACHING POINT 3**

#### **QUESTIONS**

- Q1. What holds the tinder and kindling in the centre of the tripod?
- Q2. What do you use to keep the cone dry?
- Q3. What prevents the tripod from tipping?

#### **ANTICIPATED ANSWERS**

- A1. The platform holds the tinder and kindling in the centre of the tripod.
- A2. Green boughs are used to keep the cone dry.
- A3. Ensure pole ends are driven into the ground to prevent tipping.

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#### **Teaching Point 4**

#### **Construct and Light a Luminous Cone Signal Fire as a Member of a Group**

Time: 20 min

Method: Practical Activity

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### **ACTIVITY**

#### **OBJECTIVE**

The objective of this activity is to have cadets build a luminous cone fire.

#### **RESOURCES**

- String;
- Wood;
- Boughs;
- Tinder; and
- Kindling.

#### **ACTIVITY LAYOUT**

N/A.

#### **ACTIVITY INSTRUCTIONS**

1. Divide cadets into groups of no more than nine.
2. Have cadets gather tinder, kindling and sticks.

3. Have the cadets construct a cone fire by:
  - a. making a tripod to support a fire;
  - b. using the string to lash the top of the tripod together and the side supports together;
  - c. ensuring stick (pole) ends are driven into the ground to prevent tipping;
  - d. making a platform to hold the tinder, kindling and fuel;
  - e. placing tinder and kindling in the centre of the platform;
  - f. ensuring tinder and kindling are placed together in a fashion that will ignite the cone;
  - g. ensuring there is sufficient ventilation allowing oxygen to feed the fire when lit (a fire will suffocate if there is too much fuel);
  - h. covering with green boughs (if available) to keep the cone dry; and
  - i. ensuring there is a heat and smoke outlet at the top of the cone.



Ensure that all the cadets in the group participate in the activity.

If there are more than two groups, limit the number of signal fires to be lit. The burning of additional resources will waste materials and harm the environment.

Continually inspect the construction of each signal fire and periodically ask the cadets the questions in the confirmation of TP3 to ensure they are correctly assembling the signal fire.

## SAFETY

Cadets will be supervised during the construction of the luminous cone fire.

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## END OF LESSON CONFIRMATION

The cadets' construction of a luminous cone fire in TP4 will serve as the confirmation of this lesson.

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## CONCLUSION

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## HOMEWORK/READING/PRACTICE

N/A.

## METHOD OF EVALUATION

N/A.

## CLOSING STATEMENT

When lost, the cadet will apply the S.T.O.P. principles. Planning will include construction of a signal fire. Knowing how to construct a signal fire in a survival situation will help attract help to the survival location. Safety is a key concern when dealing with fire. Principles of fire safety must be applied before lighting a fire.

## INSTRUCTOR NOTES/REMARKS

N/A.

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## REFERENCES

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