ROYAL CANADIAN ARMY CADETS

RED STAR

INSTRUCTIONAL GUIDE

SECTION 4

EO M222.04 – DETERMINE DISTANCE ALONG A ROUTE

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.

Using a topographical map of the local area, identify at least three different sets of points (A to B) to be measured during the activity in TP1.

Measure and identify 100 m to be used for establishing individual pace during TP2.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

Demonstration and performance was chosen for TP1 and TP2 as it allows the instructor to explain and demonstrate determining distance along a route while providing an opportunity for the cadets to practice these skills under supervision.

An interactive lecture was chosen for TP3 to clarify and emphasize the limitations of individual pacing.

INTRODUCTION

REVIEW

N/A.

OBJECTIVES

By the end of this lesson, the cadet shall be expected to determine distance along a route.

IMPORTANCE

It is important for cadets to be able to determine the distance along a route and pace a route as it allows them to calculate the distance between two points and to estimate the amount of time required to reach an objective or destination.

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Teaching point 1 **Explain, Demonstrate and Have Cadets Practice Determining Distance on a Map**

Time: 25 min Method: Demonstration and Performance



For this skill lesson, it is recommended that instruction take the following format:

(1) Explain and demonstrate the complete skill while cadets observe.

(2) Explain and demonstrate each step required to complete the skill. Monitor cadets as they imitate each step.

(3) Monitor the cadets' performance as they practice the complete skill.

Note: Assistant instructors may be used to monitor cadet performance.

DETERMINING DISTANCE ON A MAP

Cadets can use their maps to measure the distance between two points (A and B) on the ground. All maps are drawn to scale; therefore, a specified distance on a map equals a specified distance on the ground. The scale of a map is printed at the top and bottom of each map (e.g. Scale 1:50 000). This means that one cm on the map equals 50 000 cm (500 m) on the ground.

There are two ways to determine distance on a topographical map – point to point and along a route.

Measuring Point to Point

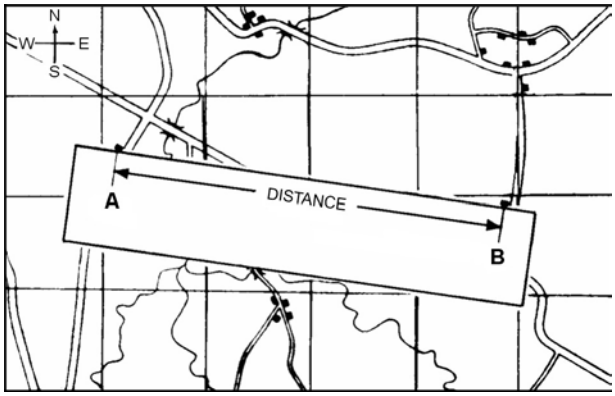

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Figure 1 Measure Distance Point to Point

To measure a distance point to point:

1. lay the straight edge of a piece of paper against the two points;

2. with a sharp pencil, mark the paper at the A (start) and B (finish) points;

3. lay the paper just under the scale bar (metres) and move the B mark backwards to each thousands mark until the A mark falls within the sub-divided thousands (hundreds) to the left of the zero; and

4. to calculate the total distance, add the number of thousands where the B mark is, plus the number of sub-divided thousands where the A mark is to the left of the zero.

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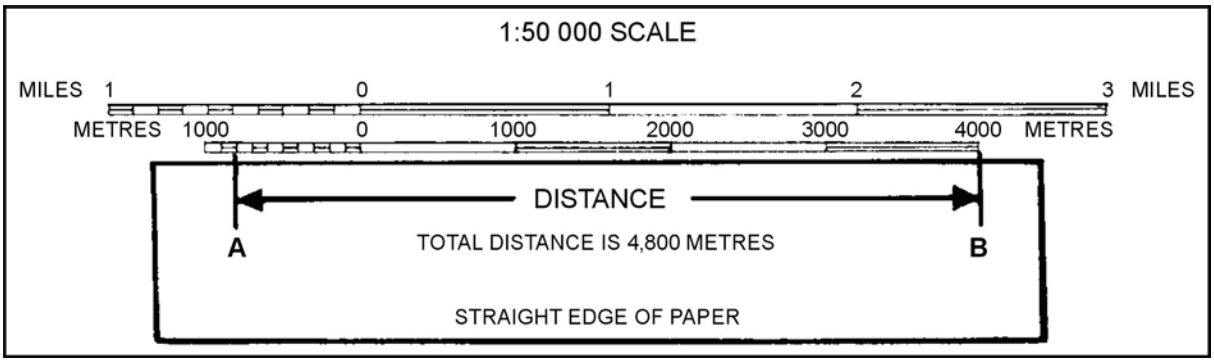

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Figure 2 Calculate Distance

For a distance that is longer than 5000 m, measure the first 5000 m and mark the paper with a new line and label it ‘5000 m’. Place the new mark at the zero or thousands mark until the A mark fits within the sub-divided thousands bar. Add the total of that distance to the 5000 m and that will be the total distance.

Measuring Along a Route

Sometimes cadets need to find the distance between A and B around curves in a road or along a planned route.

To measure a distance along a route between two points:

1. lay the straight edge of a piece of paper against point A;

2. with a sharp pencil, mark point A on the paper and the map;

3. line up the paper with the edge of the road until you come to a curve and make another mark on the paper and on the map;

4. pivot the paper so that it continues to follow the road edge. Repeat until you reach point B;

5. mark your paper and the map at point B;

6. lay the paper just under the scale bar (metres) and move the B mark backwards to each thousands mark until the A mark falls within the sub-divided thousands to the left of the zero; and

7. add the number of thousands where the B mark is, plus the number of sub-divided thousands where the A mark is to the left of the zero, will determine the total distance.

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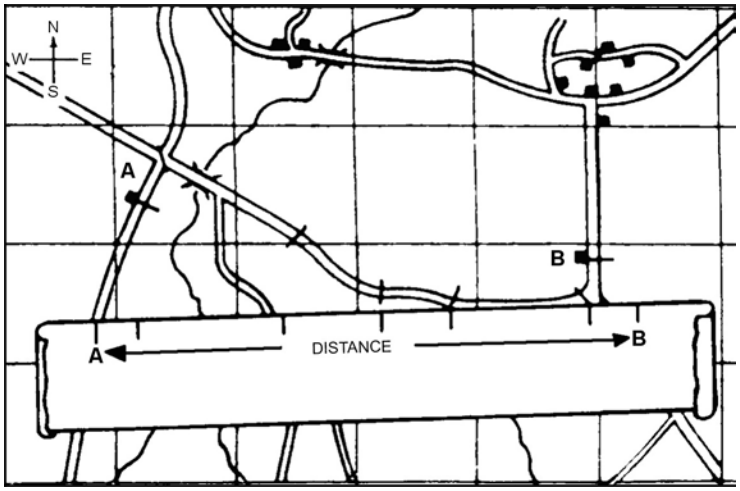

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Figure 3 Measure Distance Along a Route

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

Q1. What are the two methods of measuring distance on a map?

Q2. What is the distance on the ground, for every cm measured on a 1:50 000 scale map?

Q3. What scale bar must be used when calculating the distance measured?

ANTICIPATED ANSWERS

A1. The two methods are point to point and along a route.

A2. One cm on the map equals 50 000 cm (500 m) on the ground.

A3. The metres scale bar is used when calculating distance.

Teaching point 2 **Explain, Demonstrate and Have Cadets Practice Determining Distance Using Individual Pacing**

Time: 40 min Method: Demonstration and Performance



On a pre-measured 100 m course, arrange the cadets so they can see a demonstration and hear the explanation of individual pacing.

PACE COUNTING METHOD

The pace counting method (pacing) is used for measuring a given distance by counting every other step. Two steps equal one pace. Pacing is a very important skill in navigation, as each person has a different pace and needs to establish their pace before it can become a useful measurement tool. Pacing varies between individuals as it uses a natural stride – an average adult will pace about 60 to 70 paces in 100 m.

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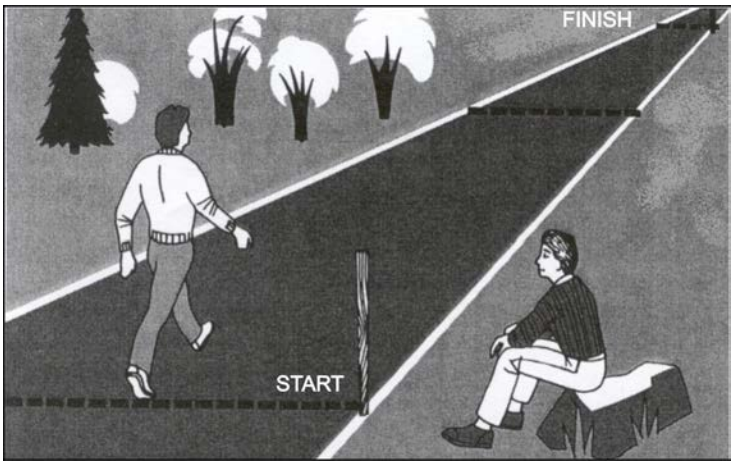
To determine an individual pace, practice taking uniform, comfortable steps over a measured distance (100 m) counting every second step of the dominant foot. Do this three to five times to get an average. This will be the individual's pace number and should be remembered.



Kjellstrom, B., Be Expert With Map & Compass, Hungry Minds, Inc. (p. 53)

Figure 4 Determining Distance Using Pacing

Remember, pacing is an approximation. A margin of error of 1–2 percent is considered reasonable (e.g. 10-20 m for every one km walked).

ACTIVITY

Time: 30 min

OBJECTIVE

The objective of this activity is to have cadets determine an individual pace.

RESOURCES

- Pre-measured 100 m, and
- Pen and paper.

ACTIVITY LAYOUT

Have defined start and finish lines clearly marked.

ACTIVITY INSTRUCTIONS

- Have the cadets start at one end of the course and pace to the other end.
- Have the cadets record their paces after each length of the course.
- After three to five lengths (approx. 25 min), have the cadets calculate the average of their pace (total paces divided by the number of times they paced).

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SAFETY

N/A.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS

Q1. What is pacing used to measure?

Q2. How many steps equal one pace?

Q3. What foot should be used to count paces?

ANTICIPATED ANSWERS

A1. It is used to measure distance.

A2. Two steps equal one pace.

A3. The dominant foot should be used to count paces.

Teaching point 3 **Discuss Factors That Affect Pacing**

Time: 15 min Method: Interactive Lecture

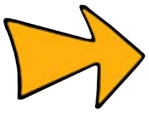


Have cadets draw on personal experience to identify the factors that affect pacing.

FACTORS AFFECTING PACING

Pacing can be affected by different factors and numbers may vary. Some of the factors and the affect on individual pacing are:

- **Topography.** This is the most common factor. Walking through mud, thick bush and tall vegetation can shorten the paces.
- **Slopes.** Walking uphill will shorten the paces, while walking downhill can lengthen the paces.
- **Fatigue.** Pacing may change from natural in the morning, when cadets are rested, and shorter in the afternoon as they start to get tired.
- **Equipment.** Equipment could affect pacing, such as the wrong type of footwear. Too much or too little clothing and the amount of equipment being carried can shorten the paces.
- **Weather.** Heavy rain, wind velocity, temperature and snow can shorten the paces.



Pacing beads can be used to keep track of the distance walked. One bead is moved for every 100 m walked. If pacing beads are not available, stones can be used by moving them from one pocket to another to count every 100 m.

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CONFIRMATION OF TEACHING POINT 3

QUESTIONS

Q1. What is the most common factor affecting pacing?

Q2. What effect does walking downhill have on pacing?

Q3. How can fatigue affect pacing from morning to afternoon?

ANTICIPATED ANSWERS

A1. The most common factor affecting pacing is topography.

A2. Walking downhill will make the paces longer.

A3. Pacing will be natural in the morning and shorter in the afternoon.

END OF LESSON CONFIRMATION

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

CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

N/A.

CLOSING STATEMENT

Being able to determine distance along a route is an important aspect of navigation training as it allows cadets to have an idea of distance travelled, distance to be travelled and a general sense of their location at all times while navigating.

INSTRUCTOR NOTES/REMARKS

N/A.

REFERENCES

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