ROYAL CANADIAN ARMY CADETS

GREEN STAR

INSTRUCTIONAL GUIDE

SECTION 3

EO M122.03 – INTERPRET CONTOUR LINES

Total Time: 30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

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

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

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for this lesson to orient the cadets to the interpreting of contour lines.

INTRODUCTION

REVIEW

The pertinent review for this lesson will include a review of EO M122.02 (Section 2).

Q1. What kind of information is found in the margin of a map?

Q2. What is a conventional sign?

Q3. Which natural features are shown in brown on a map?

ANTICIPATED ANSWERS

A1. Any from the list below:

- name of map sheet;
- number of the map and index of adjoining maps;
- date of map data;
- map scale;
- scale bars or graphic linear scales;
- contour interval;

- military index number;
- declination diagram;
- Universal Transverse Merecator Grid System (UTM); and
- legend of conventional signs.

A2. A symbol used to indicate an object or item of detail that cannot be shown either by outline or by a line symbol.

A3. Brown is used for contour lines, contour elevations, spot elevations, sand, cliffs, and other geological features.

OBJECTIVES

By the end of this lesson the cadet shall be expected to interpret contour lines in order to identify the shape of the ground as depicted on a map.

IMPORTANCE

This information allows the cadet to be able to identify features on the map as they relate to the shape and elevation of the ground. Cadets will apply this knowledge during training where any type of map is to be used. Knowing the shape of the ground will allow cadets to identify major landforms that may be nearby, thereby helping to identify their position on the map.

Teaching Point 1 **Explain and demonstrate how contour lines indicate the shape of the ground.**

Time: 25 min Method: Demonstration and Performance

The teaching of relief on a blackboard or plane surface should be avoided if at all possible. The construction of simple three-dimensional models such as those made out of putty or soft earth can help, but there is no substitute for outdoor instruction.

DEFINITION OF RELIEF ON A MAP

"Relief," or elevation, is the shape of the ground in a vertical plane. Relief on a map is the showing of the heights and shapes of the ground, above mean sea level, in feet or metres.

There are two distinct elements in the representation of relief. These are:

- **Representation of Height.** This is a fact-based representation of the height of the land and of landforms. Differences in appearance on the map will arise from the type, density and accuracy of the information provided.
- **Representation of Shape.** This may be largely artistic, and the methods used will vary between maps.

CONTOUR LINES AND INTERVALS

A contour is a line on the map joining points of equal elevation in relationship to sea level, and is the standard method of showing relief on topographical maps.

Contours are shown at a regular vertical interval (difference in height between contours lines) that is called the contour interval. The contour interval is always stated in the margin of the map, normally near the graphic scales.

Contours are normally drawn as continuous brown lines. Every fourth or fifth contour is called an "Index Contour" and is shown by a thicker brown line; this helps in reading and counting the contours to determine a height.

INTERPRETING CONTOUR LINES

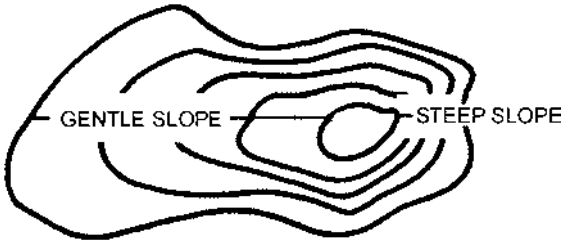
Interpreting contour lines provides a visualization of the shape of the ground, which is shown on the map by contour lines and contour intervals. Correct interpretation of the shape of the ground from contour lines requires practice and practical experience on the ground. It is essential to study various features, comparing the map to the ground in each case.

SLOPES

The instructor shall explain the following landforms by identifying the depiction on the map, followed by showing the landform in the field. In the event that models are being used in place of real ground, the model shall be introduced as the respective landform is presented. Where putty is used, fishing line can be used to slice through the landform model illustrating the concept of a contour line.

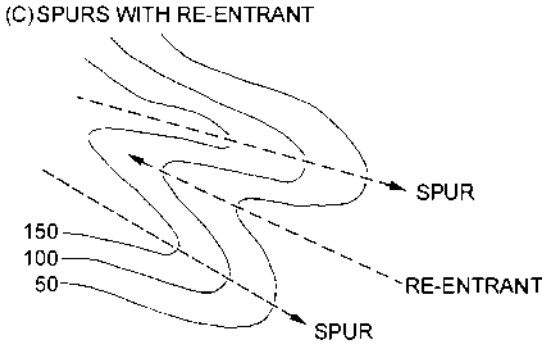
The distance between contour lines on the map will indicate to you the type of slope on the ground.

- **Steep Slope.** When the contour lines are spaced closely together there is less distance to travel to gain or lose elevation (see Figure 1).
- **Gentle Slope.** When the contour lines are further apart there is a greater distance to travel to gain or lose elevation (see Figure 1).
- **Uniform Slope.** When the contours are an equal distance apart. The slope remains constant in its decline, whether steep or gentle (see Figure 1).
- **Spurs.** A contour feature that extends out from a slope (see Figure 2).
- **Re-entrants.** A contour feature that cuts back into a slope (see Figure 2).
- **Concave Slope.** When the spacing of the contours gets further apart at the bottom. The middle of the slope seems to depress inward – appearing concave (see Figure 3).
- **Convex Slope.** When the spacing of contours down a slope gets close together at the bottom. The middle of the slope seems to bulge outward – appearing convex (see Figure 4).



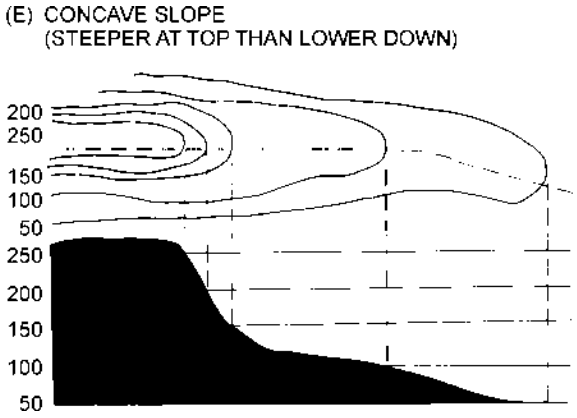
Basic Map Using A-CR-CCP-108/PT-001

Figure 1 Gentle/Steep Slopes



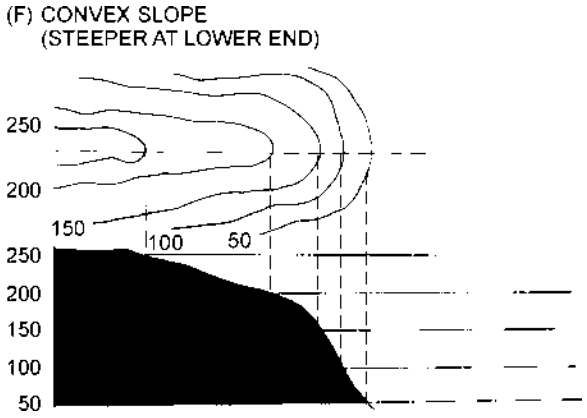
Map Field Sketch and Compass B-GL-382–005–FP-001

Figure 2 Spur and Re-entrant



Map Field Sketch and Compass B-GL-382–005–FP-001

Figure 3 Concave Slope



Map Field Sketch and Compass B-GL-382–005–FP-001

Figure 4 Convex Slope

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

Q1. The relief on a map shows what two elements?

Q2. What is the name given to the difference in height between contours lines?

Q3. What are some of the different types of slopes identified on a map?

ANTICIPATED ANSWERS

A1. The height and shape of the ground.

A2. The contour interval.

A3. Steep, gentle, uniform, concave and convex.

END OF LESSON CONFIRMATION

The information learned in this is EO can be practiced with the activity found at Attachment A. Allow cadets to complete the activity found at Attachment A, then have them switch sheets for correcting.

Alternately, the instructor may choose to have the cadets identify the respective features on a map of an area being used for an upcoming exercise.

A correctly labelled diagram is located at Page M122.03A-2 of Attachment A.

CONCLUSION

HOMEWORK/READING/PRACTICE

Nil.

METHOD OF EVALUATION

During the confirmation activity for EO M122.CA, Follow a Route Led by a Section Commander (A-CR-CCP-701/PG-001, Chapter 4, Section 11), the cadets shall be expected to identify their positions by relating major landmarks in the immediate vicinity to what is portrayed on the map. Relief types and landforms are excellent points of reference for this task.

CLOSING STATEMENT

Knowing how to interpret contour lines allows cadets to visualize the shape of the ground by reading a map.

INSTRUCTOR NOTES/REMARKS

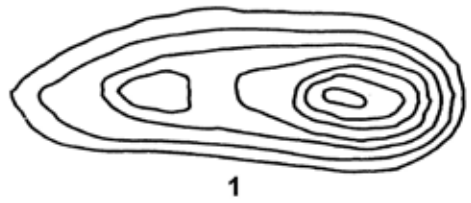
This lesson shall be taught in an outdoor setting. The instructor should use actual elevation and relate it to the contour lines on the map. Although the use of simple models may help, it is not a substitute to outdoor instruction.

REFERENCES

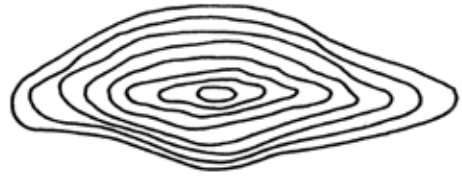
A2-004 B-GL-382-005-FP-001 Canadian Forces. (1976). *Maps, Fields, Sketching, and Compasses* (Vol. 8). Ottawa, ON: National Defence.

INTERPRETING CONTOUR LINES

Match the contour diagram on the left to the applicable depiction of a landform on the right.



1



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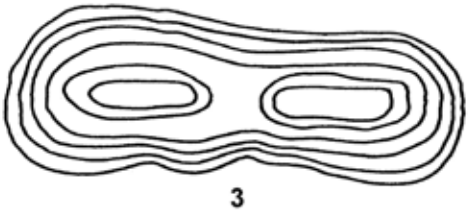

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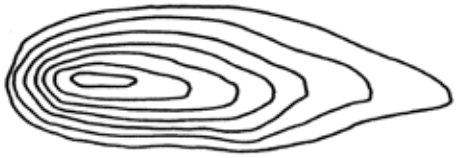

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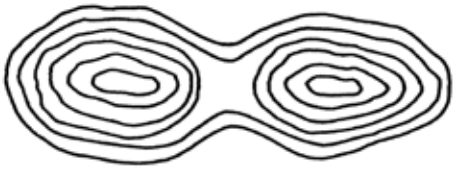


6

A

B

C

D

E

F

1. _____

2. _____

3. _____

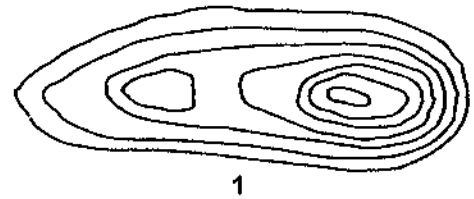
4. _____

5. _____

6. _____

INTERPRETING CONTOUR LINES

ANSWER KEY



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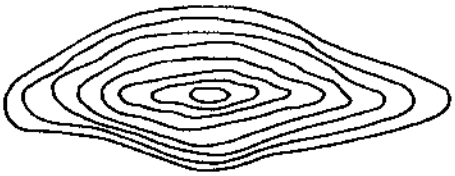

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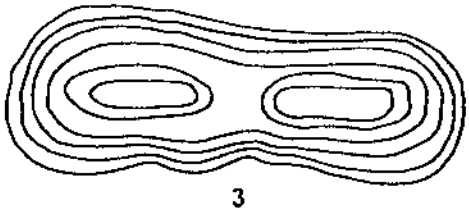

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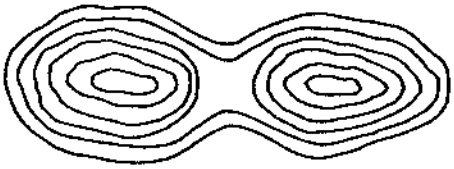

6

A

B

C

D

E

F

1. B
2. E
3. D
4. C
5. F
6. A