A-CR-CCP-114/PT-001

National Defence
Défense nationale

ROYAL CANADIAN ARMY CADETS

GUIDE TO BASIC MAP READING

Acer Acerpori xxxx As the Maple, so the Sapling

ISSUED ON AUTHORITY OF THE CHIEF OF THE DEFENCE STAFF
PUBLIÉE AVEC L'AUTORISATION DU CHEF DE L'ÉTAT-MAJOR DE LA DÉFENSE

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ROYAL CANADIAN

ARMY CADETS

GUIDE TO BASIC MAP READING

(For individual issue, to be used in conjunction with the map using instruction given in the A-CR-CCP-100 Series).

Acer Acerpori xxxx As the Maples, so the Sapling.

OPI: D Cdts

77-07-20

ISSUED ON AUTHORITY OF THE CHIEF OF THE DEFENCE STAFF
PUBLIÉE AVEC L'AUTORISATION DU CHEF DE L'ÉTAT-MAJOR DE LA DÉFENSE

LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with applicable orders.

NOTE — On a changed page, the portion of the text affected by the latest change is indicated by a vertical line in the margin of the page. Changes to illustrations are indicated by miniature pointing hands, or black vertical lines.

Total number of pages in this publication is 13 consisting of the following:

Page No.	Change No.
Title Page	0
A	0
i	0
1 to 9	0

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FOREWORD

1. A-CR-CCP-114/PT-001 Royal Canadian Army Cadets, Guide to Basic Map Reading, is issued on authority of the Chief of the Defence Staff.

2. This publication is effective on receipt and supersedes Royal Canadian Army Cadets, Guide to Basic Map Reading, dated March 1976.

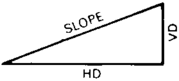
3. Suggestions for amendments shall be forwarded through normal channels to National Defence Headquarters, Attention Director Cadets.

CONVERSION FACTORS

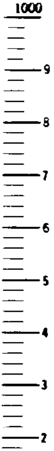
Multiply	By	To Obtain
Inches	2.54	Centimeters
Feet	30.48	Centimeters
Feet	0.3048	Meters
Yards	0.9144	Meters
Miles	1.609	Kilometers
Meters	3.28	Feet
Meters	100	Centimeters

DETERMINING PER CENT (%) OF SLOPE

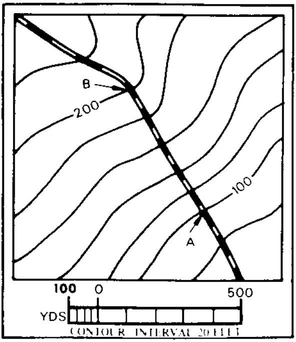
Slope may be expressed in several ways but all depend on a comparison of vertical distance (VD) to horizontal distance (HD).



The per cent slope is determined by using the following expression: $\% \text{ slope} = \frac{VD}{HD} \times 100$


1000
9
8
7
6
5
4
3
2

EXAMPLE:


B
200
100
A
100
0
500
YDS
CONTOUR INTERVAL 20 FEET

Using the map to the left, what is the per cent slope from A to B?

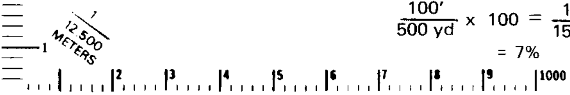
Ans: From the contour lines you know the vertical distance is 100 feet. Using the graphic scale at the bottom of the map, you find the horizontal distance to be 500 yd.

By using the per cent slope formula above ----

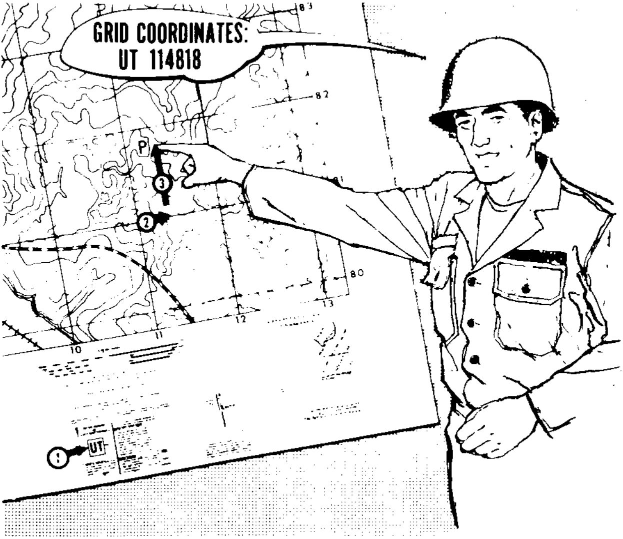
$$\% \text{ slope} = \frac{VD}{HD} \times 100 =$$

$$\frac{100'}{500 \text{ yd}} \times 100 = \frac{100'}{1500'} \times 100$$

$$= 7\%$$


1
1
12,500
METERS
2
3
4
5
6
7
8
9
1000

TO REPORT A LOCATION, READ RIGHT-UP


GRID COORDINATES:
UT 114818
P
③
②
①
UT
83
82
80
10
11
12
13

1. Give the 100,000 meter square identification letters such as "UT".

2. Read to the right the location of the point P shown above. It is approximately 4/10 the distance from 11 to 12 and is read "114".

3. Then read up. The location of point P is approximately 8/10 the distance from 81 to 82 and is read 818.

4. The grid coordinates of point P are UT 114818.

SCALE AND DISTANCE

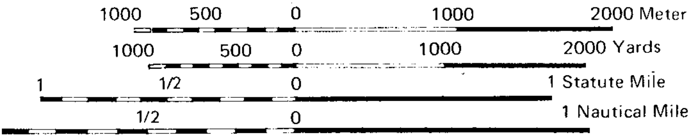
The scale of a map is expressed as "RF" (Representative Fraction). It is found in the upper left corner and lower center above the bar scales. The RF gives the ratio of a map distance to the corresponding distance on the earth's surface. With an RF of 1:50,000, one unit of measure on the map equals 50,000 units of the same measure on the ground.

BAR SCALES

To determine a straight-line ground distance between two points on a map, lay a straightedged piece of paper on the map so that the edge touches both points. Make a tick mark on the edge of the paper at each point. Move the paper down to the bar scale and read the ground distance between the points. Be sure to use the scale that measures in the unit of measure desired.

Measuring a curved line distance, use the same method as for a straight line. However, you will have to move your piece of paper along the curve, marking ticks at short straight distances as you proceed.

Note — There are generally four bar scales: statute miles, meters, yards, and nautical miles.

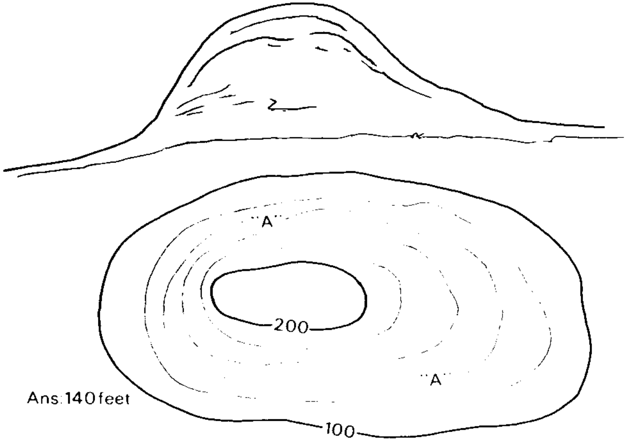


ELEVATION

A contour line represents an imaginary line on the ground along which all points are at the same elevation. Each heavy contour line is known as an index contour. Somewhere along each index contour the line is broken and its elevation is given. The lines falling between index contours are intermediate contours. The change in elevation between contours is found by applying the contour interval note found below the bar scales on military maps.

Example: What is the elevation of line A?

Note: Contour interval 20 feet.



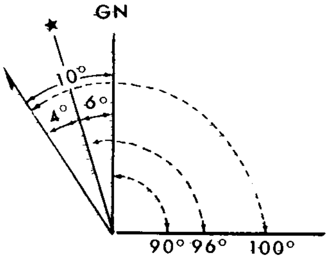
Ans: 140 feet

DIRECTION

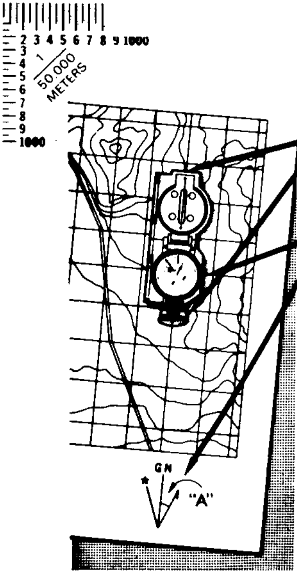
The military refers to direction by using azimuths, which are horizontal angles measured in a clockwise direction from a north base line. There are three north base lines: Magnetic North (compass) (↿), Grid North (north-south grid line) (GN), and True North (north pole) (★).

USE OF DECLINATION DIAGRAM

EXAMPLE:



The declination diagram is used when converting from one north to another. In the example above, there are 4° between Magnetic and True North and 6° between True and Grid North. To change from a Magnetic North to a Grid North you would subtract 10° from magnetic azimuth. (Azimuths are always measured in a clockwise direction). Whether you add or subtract these differences depends on what base line you are chaning to, the direction, and also the position of the three base lines in the declination diagram.

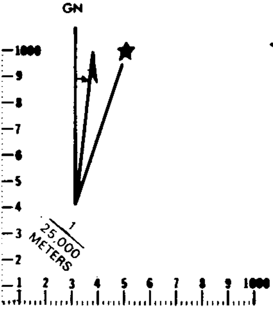

2 3 4 5 6 7 8 9 1000
3
4
5
6
7
8
9
1000
1 / 50,000 METERS
GN
"A"

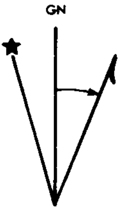
TO ORIENT YOUR MAP BY COMPASS

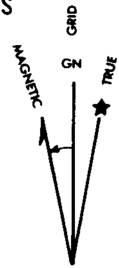
1. Align the notches at front and rear of the compass over any north-south grid line.
2. Rotate the map and compass together until the north arrow of the compass points in the direction and amount from the grid line as given in the declination diagram.

Angle at A is called the GM angle and is always measured from Grid North to Magnetic North.

EXAMPLES OF DECLINATION DIAGRAMS

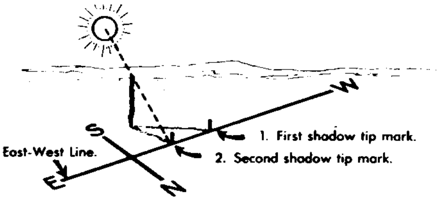

GN
1000
9
8
7
6
5
4
3
2
1
1 / 25,000 METERS
2
3
4
5
6
7
8
9
1000




GRID
MAGNETIC
GN
TRUE

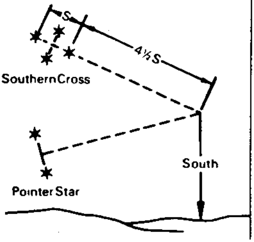
ORIENTATION WITHOUT COMPASS -- SHADOW TIP METHOD

1. Place a stick in the ground so that it stands vertically. (A tall stick is more accurate than a short one.)
2. Make a mark at the tip of the stick's first shadow (1).
3. After waiting approximately 10 minutes, make a mark at the tip of the stick's second shadow (2).
4. A line connecting these two shadow tips (1 and 2) will be an east-west line. (East is always in the direction of the second shadow tip mark.)

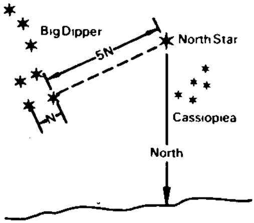

W
S
1. First shadow tip mark.
East-West Line.
2. Second shadow tip mark.
E
N

FINDING DIRECTION BY STARS

SOUTHERN HEMISPHERE
(S=long axis of Southern Cross)

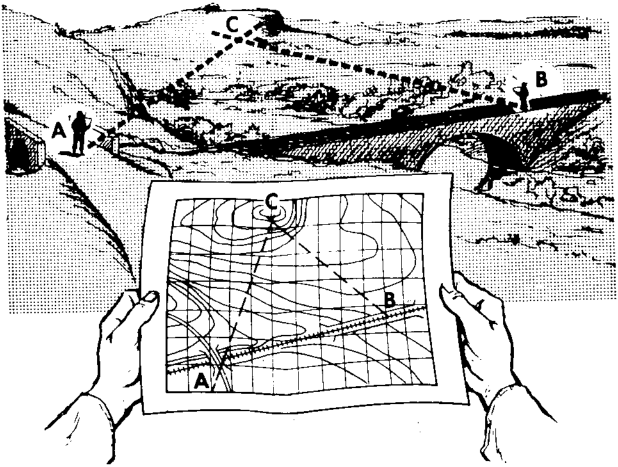

S
4½S
Southern Cross
Pointer Star
South

NORTHERN HEMISPHERE


Big Dipper
5N
North Star
N
Cassiopeia
North

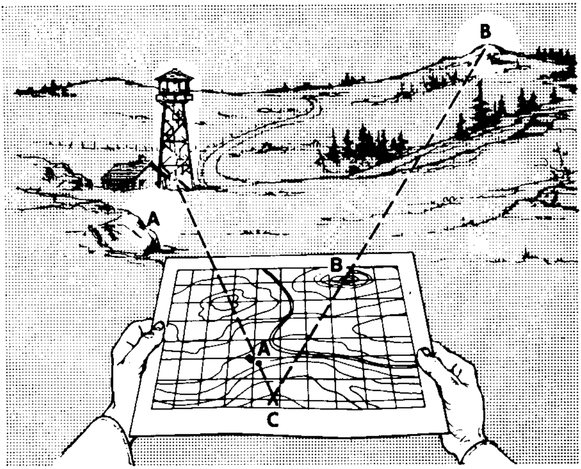
INCHES
0
1
2
3

INTERSECTION
(WHERE IS HE?)



1. Orient map and locate yourself on it (Point A).
2. Sight objective with compass (magnetic azimuth).
3. Convert to grid azimuth.
4. Plot grid azimuth on map using protractor (Line AC).
5. Move to position B and repeat steps 1 to 3.
6. Plot grid azimuth on map using protractor (Line BC).
7. The unknown location C is at the intersection of the two azimuths.

RESECTION
(WHERE AM I?)



1. Orient map by compass.
2. Locate first position on map and ground.
3. Sight objective A with compass (magnetic azimuth).
4. Convert to grid back azimuth. (If grid azimuth is less than 180 convert by adding 180. If grid azimuth is greater than 180 convert by subtracting 180 from it.)
5. Plot back azimuth on map using protractor (Line AC).
6. Repeat steps 2 through 4 for position B.
7. Plot back azimuth on map using protractor (Line BC).
8. Your unknown position C is at the intersection of the two back azimuths.