ROYAL CANADIAN ARMY CADETS

RED STAR

INSTRUCTIONAL GUIDE

SECTION 2

EO M222.02 – DESCRIBE BEARINGS

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.

Photocopy the compass rose activity sheet located at Annex A for each pair of cadets.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

An interactive lecture was chosen for TP1 to TP4 to present basic material, orient the cadets to bearings, and to generate interest.

A practical activity was chosen for TP5 as it is an interactive way to introduce cadets to bearings. This activity contributes to the development of navigation skills and knowledge in a fun and challenging setting.

INTRODUCTION

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall be expected to:

- identify the 16 points of a compass;
- define mils and degrees;
- identify true, grid, and magnetic north; and
- describe bearings.

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IMPORTANCE

It is important for cadets to describe bearings as this will assist them in finding the direction of identifiable landmarks on a map. Cadets will rely on this skill set throughout navigation and expedition training.

Teaching point 1 **Identify and Explain the 16 Points of a Compass**

Time: 10 min Method: Interactive Lecture



Draw a compass rose (circle) on the board with the four cardinal points. Draw a new line each time you introduce the inter-cardinal and intermediate points.

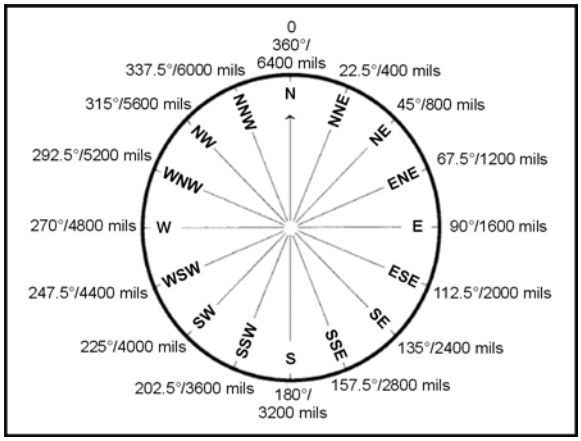

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Figure 1 Compass Rose

FOUR CARDINAL POINTS

The four cardinal points of the compass, measured at right angles clockwise are north (N), east (E), south (S) and west (W). They can be easily remembered by the using mnemonics, such as “Never Eat Shredded Wheat”.

FOUR INTER-CARDINAL POINTS

The four inter-cardinal points are located halfway between each of the cardinal points. Measured clockwise, they are:

1. north-east (NE);
2. south-east (SE);
3. south-west (SW); and
4. north-west (NW).

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EIGHT INTERMEDIATE POINTS

The eight intermediate points are located halfway between each cardinal point and inter-cardinal point. Measured clockwise, they are:

1. north-north-east (NNE);
2. east-north-east (ENE);
3. east-south-east (ESE);
4. south-south-east (SSE);
5. south-south-west (SSW);
6. west-south-west (WSW);
7. west-north-west (WNW); and
8. north-north-west (NNW).

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

Q1. What is a mnemonic used to remember the four cardinal points?

Q2. What are the four inter-cardinal points?

Q3. How many intermediate points are there?

ANTICIPATED ANSWERS

A1. “Never Eat Shredded Wheat”.

A2. North-east (NE), south-east (SE), south-west (SW) and north-west (NW).

A3. There are eight intermediate points.

Teaching point 2 **Explain the Scales on a Compass**

Time: 5 min Method: Interactive Lecture



Using the compass rose from TP1, add the degree and mils values on the outside of the circle for the cardinal points (N, E, S and W).

To express direction in an accurate and precise method, the full circle of the compass rose is divided into equal measures of angle. This measurement starts and ends at north (top) and always moves in a clockwise rotation. There are two main scales used to measure a circle – they are degrees and mils.

Degrees. The most common method of dividing a circle is by degrees. There are 360 equal angles in a complete circle and they are represented by the degree symbol (e.g. 360°). On the compass rose, north is located at 0 and 360 degrees, east is located at 90 degrees, south is located at 180 degrees and west is located at 270 degrees.

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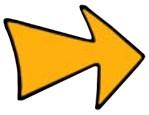
Mils. When a more accurate division of the same circle is required, the metric milli-radian (mils) method is used. The mils method has a military background and is based on the metric system with 6400 equal angles in a complete circle. On the compass rose, north is located at 0 and 6400 mils, east is located at 1600 mils, south is located at 3200 mils and west is located at 4800 mils.



There are 22.5 degrees or 400 mils between each point on a compass rose.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS

Q1. How many degrees make a complete circle?

Q2. How many mils make a complete circle?

Q3. Which are more accurate, degrees or mils?

ANTICIPATED ANSWERS

A1. 360 degrees.

A2. 6400 mils.

A3. Mils.

Teaching point 3 **Identify and Explain the Three Norths**

Time: 10 min Method: Interactive Lecture

In navigation there are three different norths that are used – true north, grid north and magnetic north. Each north varies a small amount from each other and must be known for use in navigation. A diagram representing the three norths can be found in the margin of the map being used.



Draw Figure 2 on the board and draw the symbol for each north as it is explained to the cadets.

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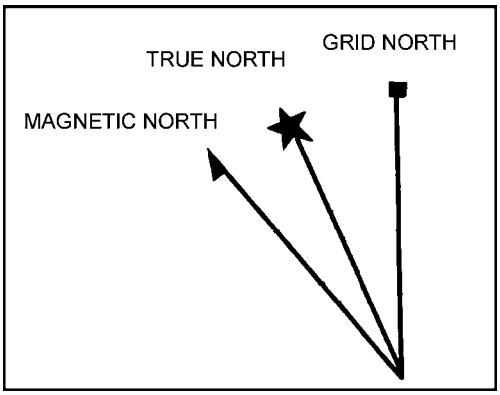

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Figure 2 Three Norths

True North. True north is located at the top of the earth where the geographic North Pole is found, and is where all lines of longitude meet. In the diagram on the map, true north is represented by a star (Polaris).

Grid North. Grid north is the north indicated by the grid lines (eastings) on a topographical map. The easting lines run parallel to each other and will never meet at the North Pole; because of this, grid north points off slightly from true north. In the diagram on the map, grid north is represented by a square (map grid).

Magnetic North. Magnetic north is the direction in which the compass needle points. This direction is to the magnetic pole which is located in the Canadian arctic and is slightly different from true north (North Pole). In the diagram on the map, magnetic north is represented by a needle (compass).

CONFIRMATION OF TEACHING POINT 3

QUESTIONS

Q1. What symbol is used to represent true north?

Q2. What symbol is used to represent grid north?

Q3. What symbol is used to represent magnetic north?

ANTICIPATED ANSWERS

A1. A star, as in Polaris.

A2. A square, as in a grid square.

A3. A needle, as in a compass.

Teaching point 4 **Explain Bearings**

Time: 10 min Method: Interactive Lecture



Poll the cadets to define an angle as they have learned in school. To represent the cardinal points; stand at the front of the class (N) and have one cadet stand six paces in front of you (S), another three paces in front and three paces to the left (E) and another three paces in front and three paces to the right (W). Using the centre point, ask the cadets what are the angles between you and each cadet.

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DEFINITION OF A BEARING

Bearing. A bearing is an angle that is measured clockwise, from a fixed zero line; north is always this zero line. Simply, a bearing is just another name for an angle.

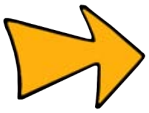
TYPES OF BEARINGS

Grid Bearings. A grid bearing is a bearing that is measure between two points on a map. The ability to measure a bearing from a map allows a map user to plan routes or activities before going into the field, and allows an easy method of communicating information about movement or location.

Magnetic Bearings. A magnetic bearing is a bearing that is measured between two points using a compass. A magnetic bearing is a quick and efficient method of describing a route to take. The bearing alone is usually not enough information to navigate with and must also have distance or a target object.

Back Bearing. A back bearing is a bearing that is in the exact opposite direction of the bearing that has been measured. A back bearing can be useful for different reasons; to return to the start location after a hike, or to calculate the bearing from an object to one's current location. Depending on the compass being used, the steps to calculate a back bearing are:

- If the bearing is less than 3200 mils or 180 degrees, add 3200 mils or 180 degrees.
- If the bearing is greater than 3200 mils or 180 degrees, subtract 3200 mils or 180 degrees.



In the 1920's, it became accepted world wide to indicate direction by a number representing an angle, measured clockwise from True North; called a "bearing".

CONFIRMATION OF TEACHING POINT 4

QUESTIONS

Q1. What is another name for an angle?

Q2. What is a grid bearing?

Q3. What is a magnetic bearing?

ANTICIPATED ANSWERS

A1. A bearing.

A2. A bearing measured on a map.

A3. A bearing measured with a compass.

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Teaching point 5 **Complete a Compass Rose Activity**

Time: 15 min Method: Practical Activity

ACTIVITY

OBJECTIVE

The objective of this activity is to have cadets label a compass rose with the inter-cardinal points and the degrees and mils value for each.

RESOURCES

Compass rose activity sheet located at Annex A of this Instructional Guide.

ACTIVITY LAYOUT

N/A.

ACTIVITY INSTRUCTIONS

1. Divide the cadets into pairs.
2. Issue each cadet with a copy of the compass rose activity sheet.
3. Allow cadets five to seven minutes to complete the activity sheet as a team.
4. Review answers starting at north to include compass point name, degrees and mils.
5. Allow cadets to keep activity sheets for future reference.

SAFETY

N/A.

CONFIRMATION OF TEACHING POINT 5

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

END OF LESSON CONFIRMATION

QUESTIONS

Q1. What is another name for a bearing?

Q2. How many degrees and how many mils make a complete circle?

Q3. What symbols are used to represent the three norths?

ANTICIPATED ANSWERS

A1. An angle.

A2. 360 degrees and 6400 mils.

A3. True north is a star (Polaris), grid north is a square (map grid) and magnetic north is a needle (compass).

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CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

N/A.

CLOSING STATEMENT

Being able to describe bearings is an important aspect of navigation training, as it allows cadets to identify direction when travelling from one point to another.

INSTRUCTOR NOTES/REMARKS

N/A.

REFERENCES

A2-041 B-GL-382-005/PT-001 Canadian Forces. (2006). *Maps, Field Sketching, Compasses and the Global Positioning System*. Ottawa, ON: Department of National Defence.

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COMPASS ROSE ACTIVITY SHEET

Fill in the missing detail for each point of the compass rose

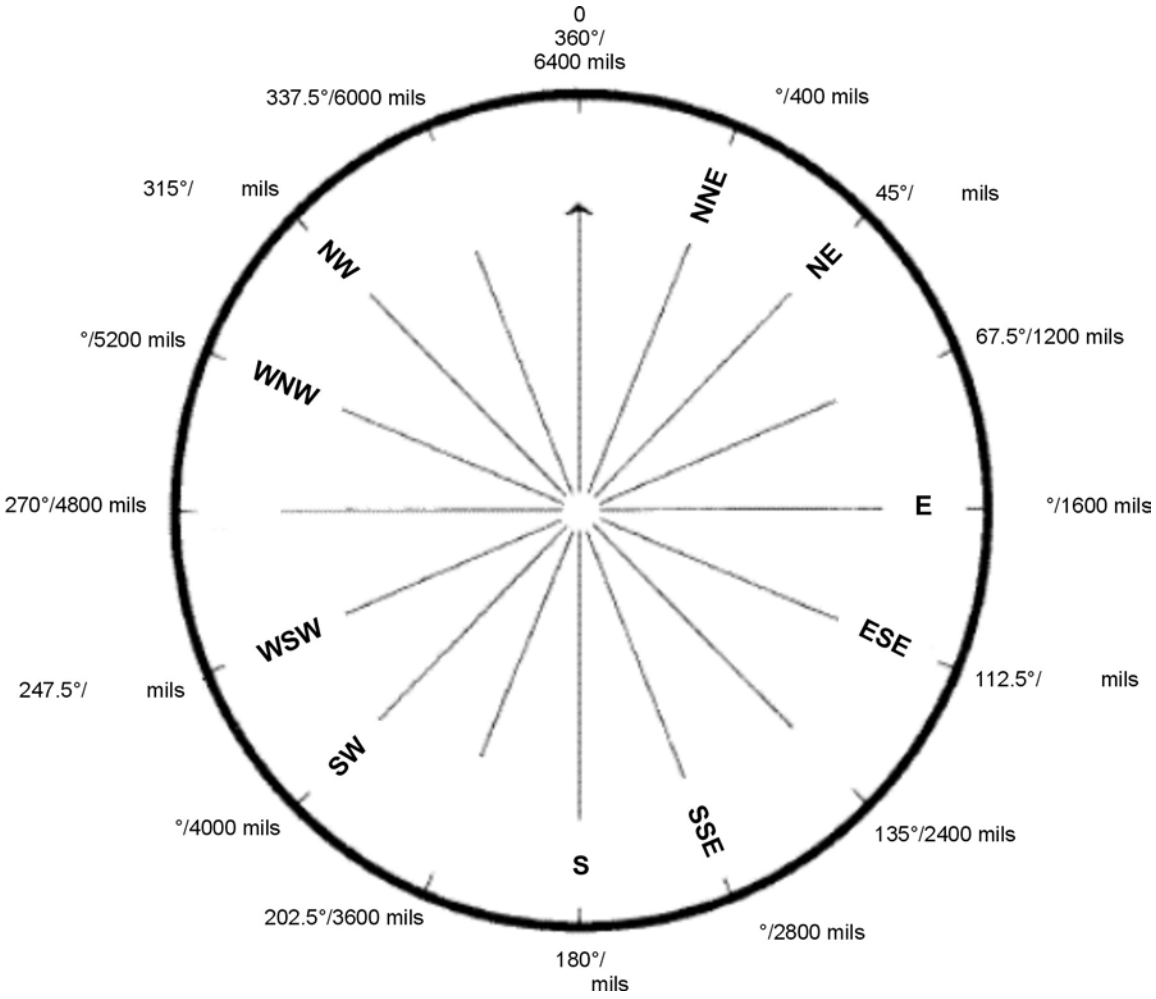

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Figure A-1 Compass Rose Activity

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