EO C422.04 – MEASURE A GRID BEARING WITH A PROTRACTOR

1. **Performance**:Measure a Grid Bearing With a Protractor
2. **Conditions**:
   a. Given:
      (1) Protractor,
      (2) Topographical map of the area being used,
      (3) Six-figure GR for start and finish points,
      (4) Grid and magnetic bearings,
      (5) Supervision, and
      (6) Assistance as required.
   b. Denied: Nil.
   c. Environmental: Field setting, during daylight hours.
3. **Standard**:The cadet shall measure a grid bearing by:
   a. plotting the six-figure GR start and finish points by:
      (1) sharpening a pencil;
      (2) identifying the start GR and marking it as point A;
      (3) identifying the finish GR and marking it as point B;
      (4) drawing a straight line from point A to point B; and
      (5) extending the plotting ray and marking the direction of travel;
   b. placing the protractor on the map by:
      (1) ensuring the centre hole is on the plotting ray;
      (2) orienting zero mils to the top of the map; and
      (3) ensuring the mils scale is placed east or west of the grid lines;
   c. aligning the protractor parallel to the eastings by:
      (1) sliding the centre hole along the plotting ray; and
      (2) matching the vertical line on the protractor with an easting line; and
   d. reading the bearing at the point where the plotting ray crosses the protractor by:
      (1) finding and reading the grid bearing off the protractor on the mils scale;
      (2) determining which bearing is the correct one; and
      (3) recording the bearing.

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4. **Teaching Points**:

TP	Description	Method	Time	Refs
TP1	Describe the features of a protrator, to include: a. 1 : 50 000 scale romer, b. 1 : 25 000 scale romer, c. a hole in each romer for plotting GRs, d. conversion scale, e. graduations in mils (outside edge), f. graduations in degrees (outside edge), g. 1 : 50 000 scale for measuring distance, h. 1 : 25 000 scale for measuring distance, i. centre lines (vertical and horizontal), j. a centre hole, and k. scales for measuring distance.	Interactive Lecture	10 min	A2-041 (pp. 40–41)
TP2	Explain, demonstrate and have the cadets measure a grid bearing with a protractor by: a. plotting the six-figure GR start and finish points by: 1. sharpening a pencil; 2. identifying the start GR and marking it as point A; 3. identifying the finish GR and marking it as point B; 4. drawing a straight line from point A to point B; and 5. extending the plotting ray and marking the direction of travel; b. placing the protractor on the map by: 1. ensuring the centre hole is on the plotting ray; 2. orienting zero mils to the top of the map; and 3. ensuring the mils scale is placed east or west of the grid lines; c. aligning the protractor parallel to the eastings by: 1. sliding the centre hole along the plotting ray; and 2. matching the vertical line on the protractor with an easting line; and	Demonstration and Performance	20 min	A2-041 (pp. 52–54) C2-041 (p. 53)

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TP	Description	Method	Time	Refs
	d. reading the bearing at the point where the plotting ray crosses the protractor by: 1. finding and reading the grid bearing off the protractor on the mils scale; 2. determining which bearing is the correct one; and 3. recording the bearing.			
TP3	Conduct an activity where the cadets will demonstrate the effects of magnetic declination adjustment.	Practical Activity	30 min	
TP4	Explain, demonstrate and have the cadets convert bearings from: a. grid to magnetic by: 1. calculating the current magnetic declination; 2. adjusting for magnetic declination; and 3. listing the magnetic bearing; and b. magnetic to grid by: 1. calculating the current magnetic declination; 2. adjusting for magnetic declination; and 3. listing the grid bearing.	Demonstration and Performance	20 min	A2-041 (pp. 52–58)

5. **Time**:

a. Introduction / Conclusion:	10 min
b. Interactive Lecture:	10 min
c. Demonstration and Performance:	40 min
d. Practical Activity:	30 min
e. Total:	90 min

6. **Substantiation**:

   a. An interactive lecture was chosen for TP 1 to introduce the cadets to the features of a protractor.

   b. A demonstration and performance was chosen for TPs 2 and 4 as it allows the instructor to explain and demonstrate the skill of measuring grid bearings with a protractor and converting bearings while providing an opportunity for the cadets to practice the skill under supervision.

   c. A practical activity was chosen for TP 3 as it is an interactive way to allow cadets to experience following a magnetic bearing in a safe and controlled environment.

7. **References**:

   a. A2-041 B-GL-382-005/PT-001 Directorate of Army Doctrine 8. (2006). *Maps, field sketching, compasses and the global positioning system*. Ottawa, ON: Department of National Defence.

   b. C2-041 ISBN 0-07-136110-3 Seidman, D., & Cleveland, P. (1995). *The essential wilderness navigator*. Camden, ME: Ragged Mountain Press.

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8. **Training Aids**:
    a. Presentation aids (eg, whiteboard / flip chart / OHP) appropriate for the classroom / training area,
    b. Protractor,
    c. Topographical map of the area being used,
    d. Grid and magnetic bearings,
    e. Pencil sharpener, and
    f. Six-figure GR for start and finish points.
9. **Learning Aids**:
    a. Protractor,
    b. Topographical map of the area being used,
    c. Grid and magnetic bearings,
    d. Six-figure GR for start and finish points, and
    e. Pencil.
10. **Test Details**:Nil.
11. **Remarks**:Topographical maps can be requested through RCSU.

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