EO M390.03 – DETERMINE GRID REFERENCES (GRS)

1. **Performance.** Determine Grid References (GRs).

2. **Conditions**

   a. Given:

      (1) Topographical map,

      (2) Paper,

      (3) Pen/pencil,

      (4) Supervision, and

      (5) Assistance as required.

   b. Denied: N/A.

   c. Environmental: Field setting during the day.

3. **Standard.** The cadet shall determine GRs, to include:

   a. a four-figure GR identifying the correct grid, and

   b. a six-figure GR to 100 m accuracy.

4. **Teaching Points**

TP	Description	Method	Time	Ref
TP1	Explain: a. the use of grid lines and the difference between eastings and northings, in that: 1. eastings (X-axis) are a series of parallel lines plotted as an overlay to the map sheet, which are drawn from top to bottom and numbered, with two digits, sequentially from west to east; and 2. northings (Y-axis) are a series of parallel lines plotted as an overlay to the map sheet, which are drawn from left to right and numbered, with two digits, sequentially from south to north; and b. GR accuracy, in that: 1. a four-figure GR is accurate within a 1000 m square; and 2. a six-figure GR is accurate within a 100 m square.	Interactive Lecture	5 min	A2-041 (p. 37)

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TP	Description	Method	Time	Ref
TP2	Explain, demonstrate, and have the cadet practice determining a four-figure GR, in that: a. four-figure GRs will have four numerical digits derived from the numbers assigned to the eastings and northings on the map sheet; b. the numbers are listed by recording the two-digit easting followed by the two-digit northing; and c. the grid lines that intersect in the bottom left corner of the grid square are used to identify that grid square.	Demonstration and Performance	10 min	A2-041 (p. 37)
TP3	Explain, demonstrate, and have the cadet practice estimating a six-figure GR by: a. creating an imaginary grid system (an overlay to divide a grid square into 100 equally sized smaller grid squares with 10 along the bottom edge and 10 along the left-side edge); b. noting that six-figure GRs will have six numerical digits derived from the numbers assigned to the eastings and northings on the map sheet and their estimated tenths; c. recognizing that the numbers are listed by recording the three-digit easting followed by the three-digit northing; and d. remembering that the grid lines that intersect in the bottom left corner of the grid square are used to identify that imaginary grid square.	Demonstration and Performance	10 min	A2-041 (p. 38, p. 39)
TP4	Define a romer as a device used for measuring a point within a grid square and identify the types of romers available for use and where to find them, to include: a. compass, b. protractor, and c. constructed.	Interactive Lecture	5 min	A2-041 (p. 40, p. 41)
TP5	Explain, demonstrate, and have the cadet construct a romer for use in determining six-figure GRs by: a. obtaining a blank piece of paper with a square edge; b. placing one side of the square edge along the 100 m scale bars; c. marking off 100 m segments beginning at the corner of the paper and working outward; d. numbering these markings from zero (at the corner of the paper) to ten; and e. repeating steps b. to d. for the adjacent edge.	Demonstration and Performance	10 min	A2-041 (p. 40, p. 41)

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TP	Description	Method	Time	Ref
TP6	Explain, demonstrate, and have cadet practice determining a six-figure GR using a constructed romer, by: a. placing the corner of the constructed romer on the bottom left corner of the grid square, noting the four-figure GR; b. moving the constructed romer to the right the number of tenths required to align the romer directly to or before (never past) the conventional sign or location for which the GR is being determined; c. reading the value along the X-axis of the romer where it crosses the easting on the map sheet (the value at this intersection becomes the value for the third digit of the six-figure GR); d. moving the constructed romer up the number of tenths required for the corner of the romer to be positioned on or before (never past) the conventional sign or location for which the GR is being determined; e. reading the value along the Y-axis of the romer where it crosses the northing on the map sheet (the value at this intersection becomes the value for the sixth digit of the six-figure GR); and f. combining the two sets of digits to create the six-figure GR.	Demonstration and Performance	10 min	A2-041 (p. 38, p. 40)

5. **Time**

a.	Introduction/Conclusion:	10 min
b.	Interactive Lecture:	10 min
c.	Demonstration and Performance:	40 min
d.	Total:	60 min

6. **Substantiation**

a. An interactive lecture was chosen for TPs 1 and 4 to introduce the grid system used to identify locations on a map.

b. Demonstration and performance was chosen for TPs 2, 3, 5 and 6 as it allows the instructor to explain and demonstrate determining four- and six-figure GRs and the construction and use of romers while providing an opportunity for the cadet to practice these skills under supervision.

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7. **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.

8. **Training Aids**

   a. Presentation aids (eg, whiteboard/flip chart/OHP/multimedia projector) appropriate for the classroom/training area,

   b. Protractor,

   c. Constructed romer,

   d. Topographical maps,

   e. Paper, and

   f. Pen/pencil.

9. **Learning Aids**

   a. Topographical map,

   b. Paper, and

   c. Pen/pencil.

10. **Test Details.** This EO is assessed IAW Chapter 3, Annex B, Appendix 6, (390 PC).

11. **Remarks.** N/A.

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