

**SECTION 14****PO 336 – IDENTIFY METEOROLOGICAL CONDITIONS**

1. **Performance.** Identify Meteorological Conditions.
2. **Conditions**
  - a. Given:
    - (1) Supervision, and
    - (2) Assistance as required.
  - b. Denied: N/A.
  - c. Environmental: An outdoor area during the day with an unobstructed view of the sky.
3. **Standard.** The cadet will identify meteorological conditions by:
  - a. discussing humidity, temperature and pressure; and
  - b. identifying types of clouds.
4. **Remarks.** The assessment of PO 336 (Identify Meteorological Conditions) should be conducted during a familiarization flying day.
5. **Complementary Material.** Complementary material associated with PO 336 is designed to enhance the cadet's knowledge of meteorology through a number of activities, specifically:
  - a. EO C336.01 (Read an Aviation Routine Weather Report [METAR]),
  - b. EO C336.02 (Tour a Meteorological Facility), and
  - c. EO C336.03 (Participate in a Presentation Given by a Flight Services Specialist).

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**EO M336.01 – DESCRIBE PROPERTIES OF THE ATMOSPHERE**

1. **Performance.** Describe Properties of the Atmosphere.
2. **Conditions**
  - a. Given:
    - (1) Supervision, and
    - (2) Assistance as required.
  - b. Denied: N/A.
  - c. Environmental: Classroom or training area large enough to accommodate the entire group.
3. **Standard.** The cadet shall describe:
  - a. the composition of the atmosphere,
  - b. the divisions of the atmosphere, and
  - c. the International Civil Aviation Organization (ICAO) standard atmosphere.
4. **Teaching Points**

TP	Description	Method	Time	Ref
TP1	Describe the composition of the atmosphere, to include: <ol style="list-style-type: none"> <li>a. the breakdown of the major gases, and</li> <li>b. the importance of water vapour.</li> </ol>	Interactive Lecture	5 min	C3-116 (p. 123)
TP2	Illustrate the divisions of the atmosphere, to include: <ol style="list-style-type: none"> <li>a. the troposphere,</li> <li>b. the stratosphere,</li> <li>c. the mesosphere, and</li> <li>d. the thermosphere.</li> </ol>	Interactive Lecture	10 min	C3-116 (p. 123, p. 124)
TP3	Explain ICAO standard atmosphere, to include: <ol style="list-style-type: none"> <li>a. the basis of ICAO standards for North America, and</li> <li>b. the assumptions for standard atmosphere in North America.</li> </ol>	Interactive Lecture	5 min	C3-116 (p. 124)
TP4	Explain the properties of the atmosphere, to include: <ol style="list-style-type: none"> <li>a. mobility, capacity for expansion, and capacity for compression, and</li> <li>b. factors affecting the properties of the atmosphere.</li> </ol>	Interactive Lecture	5 min	C3-116 (p. 123)

5. **Time**

- |                             |        |
|-----------------------------|--------|
| a. Introduction/Conclusion: | 5 min  |
| b. Interactive Lecture:     | 25 min |
| c. Total:                   | 30 min |

6. **Substantiation.** An interactive lecture was chosen for this lesson to introduce the cadet to the properties of the atmosphere.

7. **References.** C3-116 (ISBN 0-9680390-5-7) MacDonald, A. F., & Peppler, I. L. (2000). *From the Ground Up: Millennium Edition*. Ottawa, ON: Aviation Publishers Co. Limited.

8. **Training Aids**

- Presentation aids (eg, whiteboard/flip chart/OHP/multimedia projector) appropriate for the classroom/training area,
- Tennis ball or globe of similar size, and
- Four clear plastic bowls of increasing size (the smallest being large enough to fit over the globe with clearance).

9. **Learning Aids.** N/A.

10. **Test Details.** This EO is assessed IAW Chapter 3, [Annex B](#), [Appendix 5](#) (Aviation Subjects – Combined Assessment PC)

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

**EO M336.02 – EXPLAIN THE FORMATION OF CLOUDS**

1. **Performance.** Explain the Formation of Clouds.
2. **Conditions**
  - a. Given:
    - (1) Supervision, and
    - (2) Assistance as required.
  - b. Denied: N/A.
  - c. Environmental: Classroom or training area large enough to accommodate the entire group.
3. **Standard.** The cadet shall explain the formation of clouds, to include:
  - a. the classification of clouds,
  - b. air stability, and
  - c. lifting agents (process).
4. **Teaching Points**

TP	Description	Method	Time	Ref
TP1	Explain that clouds can be classified based on: <ol style="list-style-type: none"> <li>a. types of formation, and</li> <li>b. cloud height, to include:               <ol style="list-style-type: none"> <li>(1) low clouds,</li> <li>(2) middle clouds,</li> <li>(3) high clouds, and</li> <li>(4) clouds of vertical development.</li> </ol> </li> </ol>	Interactive Lecture	5 min	A3-044 (p. 8-19, p. 8-20) C3-116 (p. 124, p. 125)
TP2	Explain air stability, to include: <ol style="list-style-type: none"> <li>a. stable air, and</li> <li>b. unstable air.</li> </ol>	Interactive Lecture	5 min	A3-044 (p. 4-2) C3-116 (p. 138, p. 139)
TP3	Explain lifting agents, to include: <ol style="list-style-type: none"> <li>a. convection,</li> <li>b. orographic lift,</li> <li>c. frontal lift,</li> <li>d. mechanical turbulence, and</li> <li>e. convergence.</li> </ol>	Interactive Lecture	10 min	A3-044 (p. 2-10) C3-116 (p. 126, p. 127, p. 139)
TP4	Describe cloud formation by: <ol style="list-style-type: none"> <li>a. relating lifting agents to air stability; and</li> <li>b. relating air stability to types of formation.</li> </ol>	Interactive Lecture	5 min	

5. **Time**

- |                             |        |
|-----------------------------|--------|
| a. Introduction/Conclusion: | 5 min  |
| b. Interactive Lecture:     | 25 min |
| c. Total:                   | 30 min |

6. **Substantiation.** An interactive lecture was chosen for this lesson to introduce the concepts of cloud formation.

7. **References**

- a. A3-044 CFACM 2-700 Air Command. (2001). *Air Command Weather Manual*. Ottawa, ON: Department of National Defence.
- b. C3-116 (ISBN 0-9680390-5-7) MacDonald, A. F., & Pepler, I. L. (2000). *From the Ground Up: Millennium Edition*. Ottawa, ON: Aviation Publishers Co. Limited.

8. **Training Aids**

- a. Presentation aids (eg, whiteboard/flip chart/OHP/multimedia projector) appropriate for the classroom/training area, and
- b. Environment Canada Cloud Chart.

9. **Learning Aids.** N/A.

10. **Test Details.** This EO is assessed IAW Chapter 3, [Annex B](#), [Appendix 5](#) (Aviation Subjects – Combined Assessment PC).

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

**EO M336.03 – EXPLAIN THE EFFECTS OF AIR PRESSURE ON WEATHER**

1. **Performance.** Explain the Effects of Air Pressure on Weather.
2. **Conditions**
  - a. Given:
    - (1) Supervision, and
    - (2) Assistance as required.
  - b. Denied: N/A.
  - c. Environmental: Classroom or training area large enough to accommodate the entire group.
3. **Standard.** The cadet shall explain the effects of air pressure on weather, to include:
  - a. the formation of air masses, and
  - b. the creation of wind.
4. **Teaching Points**

<b>TP</b>	<b>Description</b>	<b>Method</b>	<b>Time</b>	<b>Ref</b>
TP1	Explain the Polar Front theory, to include: <ol style="list-style-type: none"> <li>a. the definition of atmospheric pressure,</li> <li>b. pressure systems, to include:               <ol style="list-style-type: none"> <li>(1) isobars</li> <li>(2) low pressure areas, and</li> <li>(3) high pressure areas;</li> </ol> </li> <li>c. an air mass over the polar regions,</li> <li>d. an air mass over the equatorial regions, and</li> <li>e. movement at the polar front.</li> </ol>	Interactive Lecture	10 min	C3-116 (p. 127, p. 141)
TP2	Explain that the properties (eg, pressure) of an air mass are taken from the area over which it forms, to include: <ol style="list-style-type: none"> <li>a. continental air mass,</li> <li>b. maritime air mass,</li> <li>c. arctic air mass,</li> <li>d. polar air mass, and</li> <li>e. tropical air mass.</li> </ol>	Interactive Lecture	5 min	C3-116 (p. 139)

TP	Description	Method	Time	Ref
TP3	Explain the creation of wind, to include: <ol style="list-style-type: none"> <li>the definition of wind,</li> <li>pressure gradient,</li> <li>land and sea breezes,</li> <li>diurnal variation,</li> <li>Coriolis force, and</li> <li>veering and backing.</li> </ol>	Interactive Lecture	5 min	C3-116 (pp. 127–129)
TP4	Explain the relationship between pressure systems, and wind strength and direction, to include: <ol style="list-style-type: none"> <li>low pressure areas, and</li> <li>high pressure areas.</li> </ol>	Interactive Lecture	5 min	C3-116 (p. 128)

5. **Time**

- |                             |        |
|-----------------------------|--------|
| a. Introduction/Conclusion: | 5 min  |
| b. Interactive Lecture:     | 25 min |
| c. Total:                   | 30 min |

6. **Substantiation.** An interactive lecture was chosen for this lesson to introduce the cadets to the effects of air pressure.
7. **References.** C3-116 (ISBN 0-9680390-5-7) MacDonald, A. F., & Pepler, I. L. (2000). *From the Ground Up: Millennium Edition*. Ottawa, ON: Aviation Publishers Co. Limited.
8. **Training Aids.** Presentation aids (eg, whiteboard/flip chart/OHP/multimedia projector) appropriate for the classroom/training area.
9. **Learning Aids.** Handouts of the Polar Front theory.
10. **Test Details.** This EO is assessed IAW Chapter 3, [Annex B](#), [Appendix 5](#) (Aviation Subjects – Combined Assessment PC).
11. **Remarks.** N/A.



**EO M336.04 – EXPLAIN THE EFFECTS OF HUMIDITY AND TEMPERATURE ON WEATHER**

1. **Performance.** Explain the Effects of Humidity and Temperature on Weather.
2. **Conditions**
  - a. Given:
    - (1) Supervision, and
    - (2) Assistance as required.
  - b. Denied: N/A.
  - c. Environmental: Classroom or training area large enough to accommodate the entire group.
3. **Standard.** The cadet shall explain the effects of humidity and temperature on weather, to include:
  - a. the relationship between humidity and temperature, and
  - b. types of precipitation.
4. **Teaching Points**

TP	Description	Method	Time	Ref
TP1	Explain humidity, to include: <ol style="list-style-type: none"> <li>a. condensation,</li> <li>b. sublimation,</li> <li>c. dewpoint, and</li> <li>d. relative humidity.</li> </ol>	Interactive Lecture	10 min	C3-116 (p. 135, p. 136)
TP2	Explain temperature, to include: <ol style="list-style-type: none"> <li>a. the source,</li> <li>b. diurnal variation,</li> <li>c. seasonal variation,</li> <li>d. the heating process, and</li> <li>e. the cooling process.</li> </ol>	Interactive Lecture	15 min	C3-116 (p. 136, p. 137)
TP3	Conduct an in-class activity to illustrate the effects of temperature on relative humidity, to include: <ol style="list-style-type: none"> <li>a. the effects of raising the temperature, and</li> <li>b. the effects of lowering the temperature.</li> </ol>	In-Class Activity	10 min	C3-116 (p. 136)
TP4	Explain the effects of temperature and humidity on weather, to include: <ol style="list-style-type: none"> <li>a. dewpoint,</li> <li>b. relative humidity, and</li> <li>c. precipitation.</li> </ol>	Interactive Lecture	5 min	C3-116 (p. 136, p. 137)

TP	Description	Method	Time	Ref
TP5	Explain types of precipitation, to include: a. drizzle, b. rain, c. hail, d. snow pellets, e. snow, f. ice prisms, and g. ice pellets.	Interactive Lecture	10 min	C3-116 (p. 146, p. 147)

5. **Time**

- |                             |        |
|-----------------------------|--------|
| a. Introduction/Conclusion: | 10 min |
| b. Interactive Lecture:     | 40 min |
| c. In-Class Activity:       | 10 min |
| d. Total:                   | 60 min |

6. **Substantiation**

- An interactive lecture was chosen for TPs 1, 2, 4, and 5 to introduce temperature, humidity, and precipitation to the cadets.
- An in-class activity was chosen for TP 3 as an interactive way to provoke thought about temperature and humidity.

7. **References.** C3-116 (ISBN 0-9680390-5-7) MacDonald, A. F., & Pepler, I. L. (2000). *From the Ground Up: Millennium Edition*. Ottawa, ON: Aviation Publishers Co. Limited.

8. **Training Aids**

- Presentation aids (eg, whiteboard/flip chart/OHP/multimedia projector) appropriate for the classroom/training area,
- Water,
- Small cup, and
- Large cup.

9. **Learning Aids**

- Water,
- Small cup (one per cadet), and
- Large cup (one per cadet, twice the size of the small cup).

10. **Test Details.** This EO is assessed IAW Chapter 3, [Annex B](#), [Appendix 5](#) (Aviation Subjects – Combined Assessment PC).

11. **Remarks.** Video resources are available for purchase through flight training centres or aviation supply websites. These videos may be used to augment instruction.

**EO C336.01 – READ AN AVIATION ROUTINE WEATHER REPORT (METAR)**

1. **Performance.** Read an Aviation Routine Weather Report (METAR).
2. **Conditions**
  - a. Given:
    - (1) METAR,
    - (2) Translation key,
    - (3) Supervision, and
    - (4) Assistance as required.
  - b. Denied: N/A.
  - c. Environmental: Classroom or training area large enough to accommodate the entire group.
3. **Standard.** The cadet shall read a METAR.
4. **Teaching Points**

<b>TP</b>	<b>Description</b>	<b>Method</b>	<b>Time</b>	<b>Ref</b>
TP1	Describe a METAR, to include: <ol style="list-style-type: none"> <li>a. definition,</li> <li>b. frequency of reports,</li> <li>c. special weather reports (SPECI), and</li> <li>d. where METARs are available.</li> </ol>	Interactive Lecture	10 min	C2-044 (p. 143) C3-116 (p. 160)
TP2	Review terminology used in METARs, to include: <ol style="list-style-type: none"> <li>a. report type,</li> <li>b. station indicator,</li> <li>c. date and time of observation,</li> <li>d. report modifier,</li> <li>e. wind,</li> <li>f. prevailing visibility,</li> <li>g. runway visual range,</li> <li>h. present weather,</li> <li>i. sky conditions,</li> <li>j. temperature and dewpoint,</li> <li>k. altimeter setting, and</li> <li>l. remarks.</li> </ol>	Interactive Lecture	25 min	C2-044 (pp. 143–147) C3-116 (pp. 160–163)
TP3	Demonstrate and have the cadets read a METAR.	In-Class Activity	15 min	

5. **Time**

a. Introduction/Conclusion:	10 min
b. Interactive Lecture:	35 min
c. In-Class Activity:	15 min
d. Total:	60 min

6. **Substantiation**

- a. An interactive lecture was chosen for TPs 1 and 2 to introduce the cadets to a METAR.
- b. An in-class activity was chosen for TP 3 as an interactive way for the cadets to practice reading a METAR.

7. **References**

- a. C2-044 Transport Canada. (2007). *Aeronautical Information Manual*. Retrieved October 2, 2007, from <http://tc.gc.ca/publications/EN/TP14371/PDF/HR/TP14371E.PDF>.
- b. C3-116 (ISBN 0-9680390-5-7) MacDonald, A. F., & Peppler, I. L. (2000). *From the Ground Up: Millennium Edition*. Ottawa, ON: Aviation Publishers Co. Limited.

8. **Training Aids**

- a. Presentation aids (eg, whiteboard/flip chart/OHP/multimedia projector) appropriate for the classroom/presentation area,
- b. MacDonald, A.F., & Peppler, I.L. *From the Ground Up: Millennium Edition*, Aviation Publishers Co. Limited workbook, and
- c. Recent METARs from the local airport.

9. **Learning Aids**

- a. Handout of sample METAR and SPECI, and
- b. Handout of the World Meteorological Organization (WMO) code chart.

10. **Test Details.** N/A.

- 11. **Remarks.** Recent METARs can be found at [http://www.flightplanning.navcanada.ca/cgi-bin/CreePage.pl?Langue=anglais&NoSession=NS\\_Inconnu&Page=forecast-observation&TypeDoc=html](http://www.flightplanning.navcanada.ca/cgi-bin/CreePage.pl?Langue=anglais&NoSession=NS_Inconnu&Page=forecast-observation&TypeDoc=html). Click on the METAR/TAF icon and then enter the airport name or identifier.

**EO C336.02 – TOUR A METEOROLOGICAL FACILITY**

1. **Performance.** Tour a Meteorological Facility.
2. **Conditions**
  - a. Given:
    - (1) Supervision, and
    - (2) Assistance as required.
  - b. Denied: N/A.
  - c. Environmental: The squadron Commanding Officer shall determine the conditions suitable for this training.
3. **Standard.** The cadet shall tour a meteorological facility.
4. **Teaching Points.** The tour guide is asked to explain:
  - a. the purpose and role of the facility,
  - b. meteorological equipment located at the facility, and
  - c. different types of aviation weather reports, to include:
    - (1) aviation routine weather report (METAR),
    - (2) aerodrome forecast (TAF),
    - (3) graphical area forecast (GFA),
    - (4) satellite imagery; and
    - (5) weather radar.
5. **Time**

a. Introduction/Conclusion:	10 min
b. Field Trip:	80 min
c. Total:	90 min
6. **Substantiation.** A field trip was chosen for this lesson to reinforce the cadet's knowledge of meteorology through participation in a tour of a meteorological facility setting.
7. **References.** N/A.
8. **Training Aids.** N/A.
9. **Learning Aids.** N/A.
10. **Test Details.** N/A.

11. **Remarks**

- a. If applicable, it is recommended that EO C336.03 (Participate in a Presentation Given by a Flight Services Specialist) be scheduled at the same time as this tour.
- b. This field trip can be conducted on a supported day or during a complementary session.
- c. There is no instructional guide for this EO.

**EO C336.03 – PARTICIPATE IN A PRESENTATION GIVEN BY A FLIGHT SERVICES SPECIALIST**

1. **Performance.** Participate in a Presentation Given by a Flight Services Specialist.
2. **Conditions**
  - a. Given:
    - (1) Supervision, and
    - (2) Assistance as required.
  - b. Denied: N/A.
  - c. Environmental: Classroom or training area large enough to accommodate the entire group.
3. **Standard.** The cadet shall participate in a presentation given by a flight services specialist.
4. **Teaching Points.** The guest speaker is asked to:
  - a. bring items of interest to display;
  - b. describe the role they fulfill within the aviation industry;
  - c. discuss their career progression, to include:
    - (1) prerequisites,
    - (2) training, and
    - (3) postings; and
  - d. describe highlights of their career.
5. **Time**

a. Introduction/Conclusion:	5 min
b. Interactive Lecture:	55 min
c. Total:	60 min
6. **Substantiation.** The interactive lecture was chosen for this lesson to orient the cadets to the topic and generate an interest in meteorology.
7. **References.** N/A.
8. **Training Aids.** Presentation aids (eg, whiteboard/flip chart/OHP/multimedia projector) appropriate for the classroom/presentation area.
9. **Learning Aids.** N/A.
10. **Test Details.** N/A.
11. **Remarks**
  - a. A flight services specialist may be found at most airports that have a manned air traffic services facility.
  - b. Training aids should be determined by contacting the guest speaker prior to the presentation.

- c. This presentation may be combined as part of EO C336.02 (Tour a Meteorological Facility).
- d. There is no instructional guide for this EO.