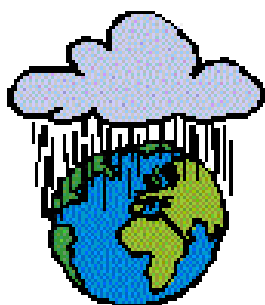


Weather Dynamics Unit Outline: Grade 10 Academic

Jennifer Courts, Deborah Park and Paul Romano

The following provides an outline for the topics, subtopics, and content covered in the lesson plans which follow as a part of this unit. Each topic may take anywhere from 1 - 3 lessons to cover in its entirety. It is important to note that not all of the subtopics and content for each topic have to be covered. Once you read the lesson plan for the indicated topic, you may wish to eliminate some of the content due to time constraints.



Air & the Atmosphere

- Formation & Composition of the Atmosphere (O₂, CO₂, N₂, and He)
- Division of the Atmosphere (troposphere, stratosphere, mesosphere, and thermosphere)
- Heat Transfer within the Atmosphere (condensation, conduction, counter radiation, albedo)

The Hydrosphere

- Oceans/Water (depth of biological activity)
- Ocean Currents (major currents of the world, solar activity and currents, climate moderators, transferors of heat)

The Water Cycle

- Water Availability (salt and fresh)
- States of Water (solid, liquid, and gas)
- Transfer of Water
- Water as a Resource (recreational, economic, environmental)

Wind & Air Movement

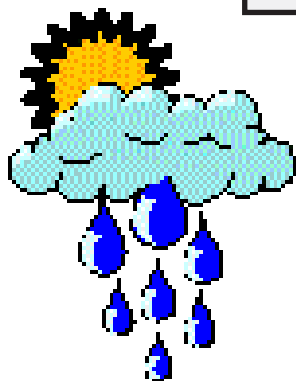
- Velocity (pressure gradient force, horizontal and vertical air movement, land and sea breezes)
- Circulation (Coriolis Force, Hadley, Ferrel and Polar Circulation)
- Jet Streams in the Upper Atmosphere (Rossby waves, polar and subtropical jet streams)

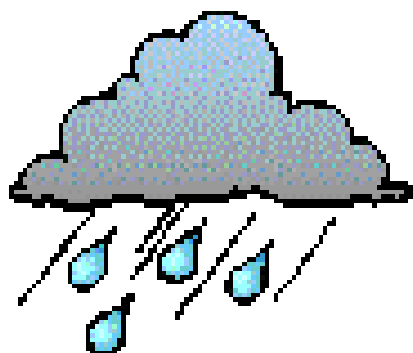
Air Masses & Fronts

- Role of Air Pressure
- Air Masses (definition, description, classification, properties, types in North America, modifications)
- Fronts (definition, description, characteristic attributes, 4 types, associated weather changes)
- Interaction between Fronts and Air Masses

Weather Disasters

- Cyclones (description, features, distinguishing characteristics, associated weather changes)
- Monsoons (description, features, distinguishing characteristics, associated weather changes)
- Hurricanes (description, features, distinguishing characteristics, associated weather changes)
- Tornadoes (description, features, distinguishing characteristics, associated weather changes)





Clouds & Precipitation

- Cloud Development
- Classification of Clouds
- Characteristics of Clouds
- Precipitation Processes
- Formation of Precipitation
- Lightning & Thunderstorms
- Formation of Fog



Weather Forecasts

- Elements of temperature, wind speed & direction, atmospheric pressure, humidity, dew point, precipitation
- Weather Stations
- Forecasting (observation skills, rules for predicting forecasts, use of forecasting tables, interpretation)



Technology

- Cultural Understandings of Weather (folklore, superstitions, weather & health, interpretations)
- Role of Media (TV, movies, newspapers, cartoons)
- Weather & Recreation (ballooning, ocean sailing races, gliding, skiing)
- Role of Technology (computer simulations, satellites & remote sensing)
- Modifications of Environmental Conditions (seeding of clouds, fire fighting)

Environmental Related Weather Phenomena

- Air Pollution (definition, description, role of weather dynamics; environmental, political, economic, & associated health issues)
- Smog (definition, description, role of weather dynamics; environmental political, economic, & associated health issues)
- Acid Rain (definition, description, role of weather dynamics, environmental political, economic, & associated health issues)
- Global Warming (definition, description, role of weather dynamics, environmental political, economic, & associated health issues)



Factors Affecting Weather Systems

- El Nino (definition, characteristics, impact on weather systems, associated myths, environmental, political, economic, and health issues)
- Water Bodies (definition, characteristics, impact on weather systems, associated myths, environmental, political, economic, and health issues)
- Glaciers (definition, characteristics, impact on weather systems, associated myths, environmental, political, economic, and health issues)
- Rainforests (definition, characteristics, impact on weather systems, associated myths, environmental, political, economic, and health issues)
- Ozone Layer (definition, characteristics, impact on weather systems, associated myths, environmental, political, economic, and health issues)
- Greenhouse Effect (definition, characteristics, impact on weather systems, associated myths, environmental, political, economic, and health issues)

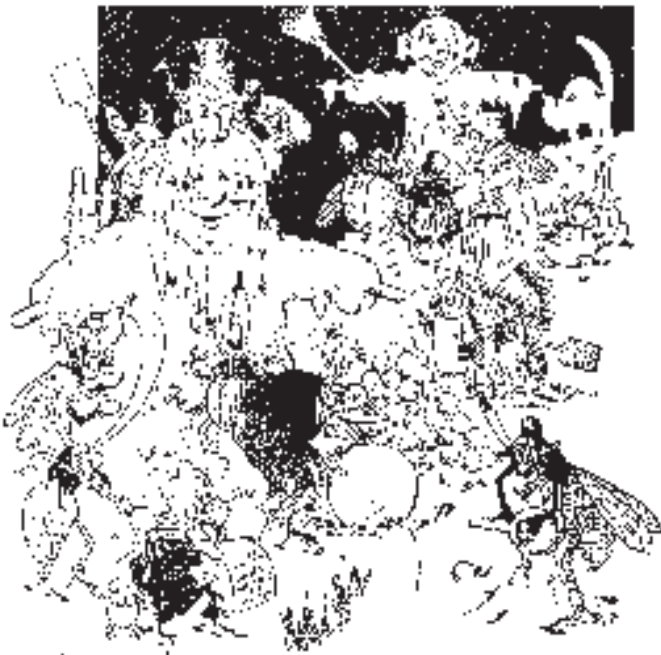
Grade 10 Weather Dynamics Unit

Annotated Bibliography

Susan V. Bosak. (1991) "Science Is...A Sourcebook of Fascinating Facts, Projects, and Activities" Toronto: Scholastic Canada Ltd. and The Communication Project. A collection of science related activities and experiments, that can be used by teachers in the intermediate/senior settings. Activities in the book are ready-to-use. Examples include: the movement of air, density currents, and simulations of a hydrologic cycle.

Earth Sciences Video Library. (1991) "Hurricane: Earth's Greatest Storm" Fort Collins, CO: Scott Resources. This 20 minute, full motion video explains the fascinating stories of two hurricanes, Wilma and Hugo, both born from the tropics yet each destined for different life histories. "Hurricane: Earth's Greatest Storm" tracks Wilma as she grows from a tropical storm, reaches hurricane strength, and then weakens. Hugo, however, presents a different story having struck land areas in the Caribbean and southeastern US, leaving a \$7 billion trail of destruction. This video clearly explains the atmospheric processes that spawn these powerful storms.

D. Phillips. (1998) "The Canadian 1999 Weather Trivia Calendar" Calgary: Fifth House. A wonderful resource featuring information pertaining to weather facts and figures. The calendar includes: All-new Canadian weather history for each day of the year, full-colour seasonal photographs, weather stories from Canada and around the world, Canadian record holders, weather folklore and superstitions, weather-wise quiz, weatherspeak explained and great Canadian weather-surviving inventions. It even explains how you could get a tropical storm named after yourself. Excellent source for books.



Prentice Hall. (1994) "Integrated Science Activity Book" Massachusetts: Prentice Hall Inc. (ISBN# 0-13-402199-1) This reference is similar in structure to the 'Science Is' activity book. It is exclusively designed to provide the educator with an abundance of activities that can be utilized to facilitate student learning.

Nancy Spaulding. (1989) "Earth Science" Toronto: D.C. Heath Canada Ltd. (ISBN# 0-669-95294-X) Included in this text is a complete section on Atmospheric Science. The sub-headings include: The heating of the atmosphere, atmospheric pressure and winds, evaporation, condensation, and precipitation, air masses and fronts, storms and weather forecasts, and factors that control climate. There is a plethora of both information and activities that can be employed by the teacher of a weather dynamics unit.

Quentin Stanford. (1989) "Geography - A Study of its Physical Elements" Toronto: Oxford University Press. (ISBN# 0-19-540589-7) This resource can be used as a supplement to the Earth Science text when teaching weather dynamics. It is designed in textbook format, but tends not to provide as many interactive learning experiences as the Earth Science text. Headings and subsequent sub-headings include: a) The Hydrosphere - water and the oceans, b) The Atmosphere - atmospheric composition, solar energy, atmospheric winds and pressure, atmospheric moisture, air masses fronts and storms, climate classification and climate change.

G. Birchall and J. McCutcheon. (1993) "Planet Earth: A Physical Geography" Toronto: John Wiley and Sons. (ISBN: 0-471-79486-4)

H.J. de Blij. "The Earth: An Introduction to its Physical and Human Geography, 4th edition" Toronto: John Wiley and Sons.

A. Getis, J. Getis and J.D. Fellman. "Introduction to Geography, 6th edition" Boston: McGraw-Hill.

T.E. Graedel and P.L. Crutzen (1995) "Atmosphere, Climate and Change" New York: W.H. Freeman and Co.

Q.H. Stanford (1988) "Geography: A Study of its Physical Elements" Toronto: Oxford Press. (ISBN: 0-19-540589-7)

All of the above publications are intended for geography studies, especially physical geography. In each of the above books, there are sections pertaining to climate and weather, each of which presents an integrated and informative analysis.