

## Unit 2: Chapter 2

Canada's Physical Geography



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### Introduction

- Canada's geography (landforms and climate) impacts Canadian Identity.
- We will start this chapter with two questions in mind.
  - What are Canada's landforms?
  - What is Canada's climate?
- Through these two questions you should begin to learn how where we live impacts who we are as a people.

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### Building Landforms

- Before we can look at what is on the surface of the earth we must look at what is below the surface.
- Canada has some of the oldest rocks in the world. Many of them dating back to 4 billion years ago. As we work our way below the surface we find that the earth is divided into many layers.

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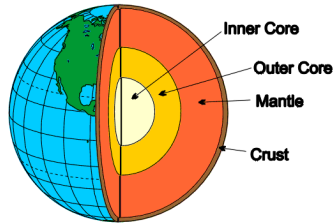
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### Layers of the Earth



- Using your text define the following terms. Look at the diagram in your book, what term is missing from the diagram on the board. Add it to your list and define it as well.

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### Movement of the Crust

- The mantle, is made of a melted rock called **magma**. It is a hot, relatively dense and slow-moving fluid.
- This material causes the earths crust to move. The crust is divided into areas called plates. The movement of these plates is called **plate tectonics**.

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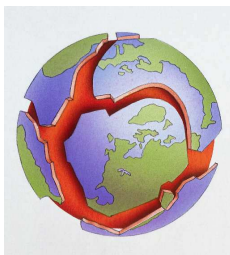
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### Plate Tectonics

- Tectonic plates move or float on top of the mantle (more details in world geography). However they do not float freely.



<http://hamertech.wikispaces.com/Plate+Tectonics>

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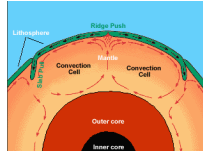
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- The plates are forced in specific directions by the flow of magma beneath. Just like a boat caught in a current plates move with the flow of magma.
- The magma forms convectional currents. The magma closer to the core heats and then rises towards the surface as its density decreases. Once the rising magma reaches the lithosphere it moves in opposite directions.



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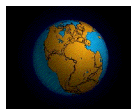
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- Because we now know that the earth's plates we can make deductions about the past. A German scientist Alfred Wegener proposed a theory of **Continental Drift**.
- He believed that all the earth's continents were once part of a super continent called Pangaea.



- Using your text write down the Evidence for Wegener's theory.

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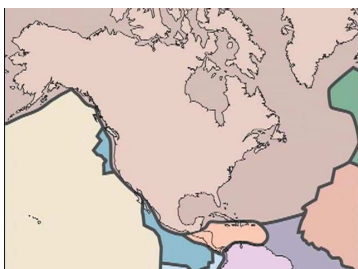
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### Canada's Crust

- Canada is located on the northern part of the North American Plate.



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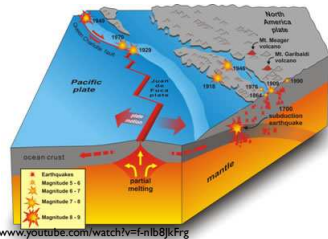
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- The North American Plate is moving 2 to 4 cm's per year as it separates from the Eurasian Plate.
- The Plate moves against the Pacific Plate creating a **subduction zone**.



• <http://www.youtube.com/watch?v=F-nb8jkFrg>

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### Assigned Work

1. Using Figure 4.2 and your knowledge of plate tectonics figure out why The edges of the Pacific Plate has been nicknamed the “Pacific Ring of Fire”?
2. Explain why Eastern Canada experiences relatively few major earthquakes.

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### What are Landforms?

- The **topography** is a general term referring to the surface features of the earth like, hills, mountains, valleys, plains, plateaus and other relief features.
- A **landscape** is the areas landforms with its cover of vegetation, water, ice and rock.
- **Question:** How do you think the landscape in a particular area can effect people's lives?

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• Using your note book or the lines on the side of this handout. Write out the definitions for describing topography in your textbook.

- Elevation
- Relief
- Gradient
- Geology
- General Appearance

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### How are landforms built?

- The earth's surface is built of material that comes from beneath the crust, or is formed from the movement of the crust itself.
- Remember **convection currents** from the other day. Refer to figure 2.6 in your text. (Please note: figure numbers may change when we get the new edition of the text)

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- As the **convection currents** move they push and pull the surface of the earth. Mountains are created, old land disappears and new land is created.

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### How Are Landforms Shaped?

- Our topography is shaped by one or all of the four forces listed below:
  - the building-up forces of **mountain building**
  - the wearing-down forces of **weathering**, or exposure to the atmosphere
  - the wearing-down forces of **erosion**
  - the building-up forces of **deposition**, where eroded materials add new shapes.
- Using your text define the four forces listed above.

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### Looking more closely at Mountain Formation

- Using your text draw and describe the four types of mountain formation in figure 2.7.
- Remember to use your own words for your description.

Extended Inquiry: On the way home today look at the rock cuts along side of the road. What patterns do you see? Can you determine how the local **topography** was formed?

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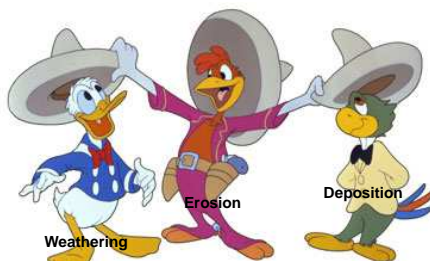
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### The Three Amigos



- Using Figure 2.8 explain how the three terms above work together to shape the land?

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### Canada's Landform Regions

- Using your text and an atlas complete the workbook provided.
- Please note: your workbook will serve as your notes for this topic of the course.

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- Climate has one of the greatest impacts on Canadians' sense of identity.
- **Climate** is how we describe the patterns of weather conditions over along period of time. **Weather** is just our daily observation at a particular time.
- Without discussing the topic with anyone in the class, quickly answer the following question in your note book:
  - Describe the climate in Canada.
- Show of hands, how many wrote something about snow? 😊

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### Elements of Climate (Outline)

- Global Factors
  - Latitude
  - Air Masses and Winds
  - Ocean Currents
  - Clouds and Precipitation
- Regional Factors
  - Altitude
  - Bodies of Water
  - Mountain Barriers

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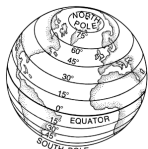
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### Global Factors

- Latitude
  - Latitude is measured as the distance away from the equator. (0° at the equator, 90° at the poles)
  - The closer to the equator the more direct sunlight you receive. This means that these areas receive high amounts of solar radiation (see figure 2.15)




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### Air Masses and Winds

- Air masses tend to keep the characteristics of the place they originate.
- Air masses over bodies of water or areas of land have different characteristics and names.
- Using your text identify and explain the four major types of air masses.
- What is the **jet stream**?
- Why would many people in Eastern Canada be concerned with the weather in Western Canada?

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### Ocean Currents

- One geographer referred to ocean currents as the “thermostat of the world”.
- They move immense amounts of heat and cold around the world impacting the climate in each region.
- Using the figure 2.17 name the currents that impact Canada.
- What kind of impact do you think the Labrador current has on Newfoundland?

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## Clouds and Precipitation

- What you really need to know from this section is that the topography of the land can impact the type of rain/precipitation patterns in an area. We have three major types of precipitation that we study:
  - Frontal
  - Convectional
  - Relief (Orographic)

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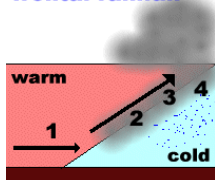
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## Frontal Precipitation

- **Stage 1:** An area of warm air meets an area of cold air.
- **Stage 2:** The warm air is forced over the cold air
- **Stage 3:** Where the air meets the warm air is cooled and water vapour condenses.
- **Stage 4:** Clouds form and precipitation occurs

frontal rainfall




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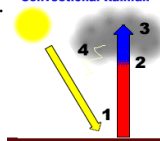
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## Convectional Precipitation

- **Stage 1:** The sun heats the ground and warm air rises.
- **Stage 2:** As the air rises it cools and water vapour condenses to form clouds.
- **Stage 3:** When the condensation point is reached large cumulonimbus clouds are formed.
- **Stage 4:** Heavy rain storms occur. These usually include thunder and lightning due to the electrical charge created by unstable conditions.

Convectional Rainfall




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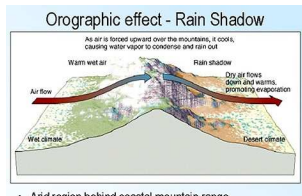
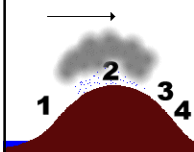
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## Relief (Orographic) Precipitation

- **Stage 1:** Warm wet air is forced to rise over high land.
- **Stage 2:** As the air rises it cools and condenses. Clouds form and precipitation occurs.
- **Stage 3:** The drier air descends and warms.
- **Stage 4:** Any moisture in the air (e.g. cloud) evaporates.

### Relief Rainfall



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## Page 36

- Complete Review and Reflect question.
- Complete Apply and Extend part b.

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## Regional Factors: Altitude

- Altitude is defined as the height of an object or point in relation to sea level or ground level.
- As a rule: the higher up you go, the colder it becomes.

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### Bodies of water

- Bodies of water like lakes and oceans have a major influence on climate. In the summer they tend to cool down a location, while in the winter they tend to keep a place warmer. This happens because water is slower to heat up in the spring/summer, but is slower to cool in the fall/winter.

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### Mountain Barriers

- Mountains tend to have a major impact on a climate.
- Typically, mountains will have a rainy side and a dry side. The dry side is often called the rain shadow.
- What happens is the prevailing winds will bring moisture up the mountain. As the air cools the water molecules are released as a form of precipitation. As the wind carries the air over the top of the mountain, the majority of the water has been released on the windward side of the mountain making the leeward side very dry. See diagram on next slide.
- See diagram on next slide

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**The rainshadow effect: the process**

The rain shadow effect is a result of orographic lift. As orographic lift mountains act as a barrier to clouds' movement and precipitation is lifted over the mountain. The windward side of the mountain receives plenty of rain, while the leeward side is much drier, resulting in a desert.

- 1 Water evaporates into the air.
- 2 Wind pushes clouds toward the mountain. The clouds rise, the air cools, and the water vapor condenses.
- 3 The windward side of the mountain gets rainfall.
- 4 As the clouds come over the mountain, they lose their water, then fall and heat up again, leaving little rain for the leeward side of the mountain.

**Where can you find it?**

**The deserts that are left behind...**

Due to its position, the Sonoran Desert has many of the agricultural products of the North American desert with the most biological diversity. Part of the desert receives 18-23 inches of rain a year.

The Great Basin is the largest desert in North America and most of the south of international borders. It has red soil and warm and sunny hot summers, receiving less than 10 inches of rainfall a year.

The Mojave Desert receives less than 8 inches of rain a year due to the rain shadow effect created by the Sierra Nevada and other mountain ranges within the desert.

**Complete Apply and Extend on page 38**

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**Page 38 to 40**

- Complete worksheet on Climate Regions in Canada.

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