

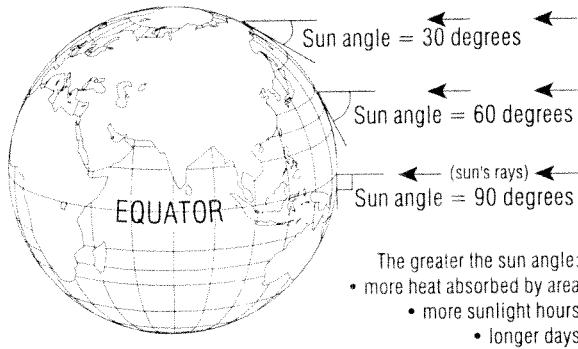
**Factors Affecting World Climate**  
(page 2)

**Factors Affecting Climate**

**1. Latitude**

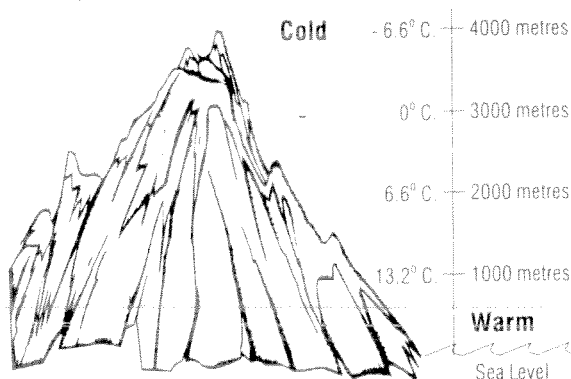
Lines of Latitude, measured in degrees, are imaginary lines running East-West around the Earth. Latitude is used to measure the distance north and south of the equator. Lines of latitude run parallel to each other. Latitude is the most important factor affecting temperature. Latitude controls both the angle at which the sun's rays strike the Earth's and the duration of daylight (see diagram below).

Date: September 22 (Equinox), Sun directly over the equator



**2. Altitude**

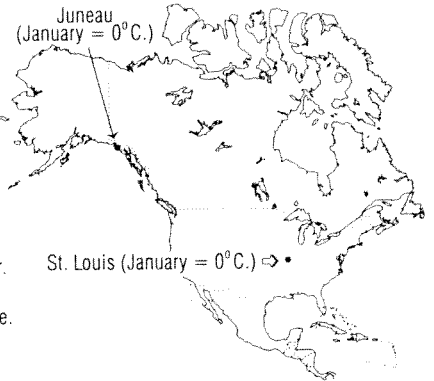
Altitude, measured in metres, is the vertical distance above sea level. The higher a mountain climber ascends, the colder it becomes. The climber would notice a drop of 1 degree Celsius for each 150 metres he or she ascends. This cooling rate is called the *Environmental Lapse Rate* (see diagram below).



**3. Proximity to Large Bodies of Water.**

Land masses near large bodies of water (Oceans, Seas, Gulfs, etc.) will have their summer and winter temperatures moderated by the water. For example, coastal Californian cities have warmer and wetter summers than same latitude cities 100 kilometres inland. Vancouver's winter is mild in comparison with Winnipeg's winter. The climate of areas near large bodies of water is called a Maritime climate (see diagram below).

The temperature of Juneau is moderated by the Pacific Ocean. Juneau has a Maritime climate.



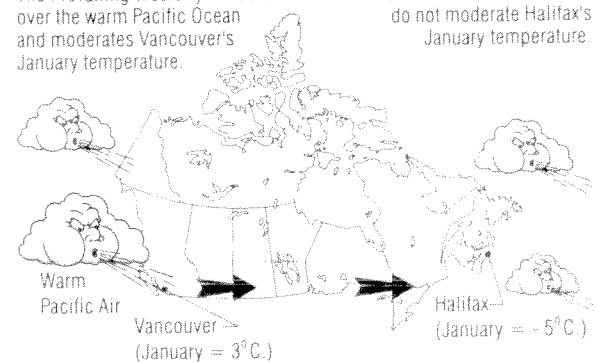
The temperature of St. Louis is unaffected by a large body of water. St. Louis has a Continental climate.

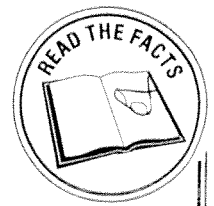
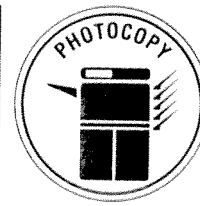
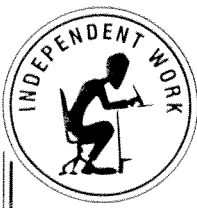
**4. Prevailing Wind Systems**

Winds that blow from the ocean onto the land will moderate the temperature on land. The wind absorbs heat and moisture from the water and releases it over land. Winds blowing over warm water will increase this moderating effect. Winds blowing over cold water onto land may have a small moderating effect (see diagram below).

The Prevailing Westerly winds blow over the warm Pacific Ocean and moderates Vancouver's January temperature.

The winds blow offshore and do not moderate Halifax's January temperature.

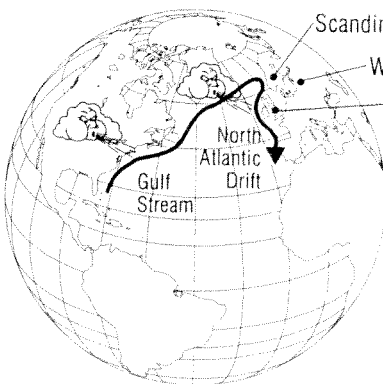




**Factors Affecting World Climate**  
(page 3)

**5. Ocean Currents**

Ocean currents may develop in warm or cold water. Their direction of flow is controlled by prevailing winds and several other factors. Ocean currents affect the temperature of the air masses blowing over the water. As mentioned in Prevailing Wind Systems, the wind absorbs heat from the water and releases it over land. For example, the Gulf Stream is a very warm ocean current flowing northward along the east coast of the USA. This current has little effect on the USA because the prevailing winds blow offshore (from the land to the sea). However, this current crosses the North Atlantic and drifts into Western Europe. The onshore winds (from the sea to the land) warm the winters of the British Isles, Scandinavia and Western Russia (see diagram below).

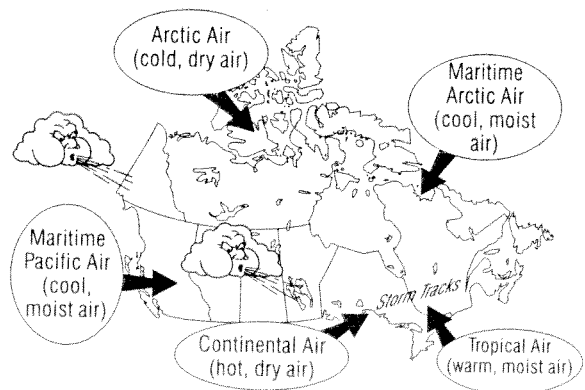


Compare:  
Tromso, Norway  
January = - 2°C.  
(latitude 70° N)  
to  
Halifax, Canada  
January = - 5°C.  
(latitude 45° N).

**6. Air Masses**

The movement of air masses is caused by the differences in atmospheric pressure. Air masses flow from areas of high pressure to areas of low pressure. Air masses are identified by the area of origin. Air masses which form over land are called **continental air masses** and those which form over water are called **maritime air masses**. Air masses may be **cool, cold, warm or hot**. The edge of an air mass is called a **front**. There are 5 major air masses which affect Canada either by forming here or moving from other areas into Canada. These are the:

- Maritime Pacific Air (cool and moist)
- Arctic Air (cold and dry)
- Maritime Arctic air (cool and moist)
- Continental Air (hot and dry)
- Tropical Air (warm and moist)



Each air mass follows the direction of the prevailing winds. Cold air cannot carry much moisture. The Arctic is often called a desert because it is too cold in the winter to snow. However, the snow that does fall remains all winter. Warm air is capable of carrying large quantities of moisture (see diagram above).



**Factors Affecting World Climate**  
**Study Organizer (page 4)**

**DAY 1**

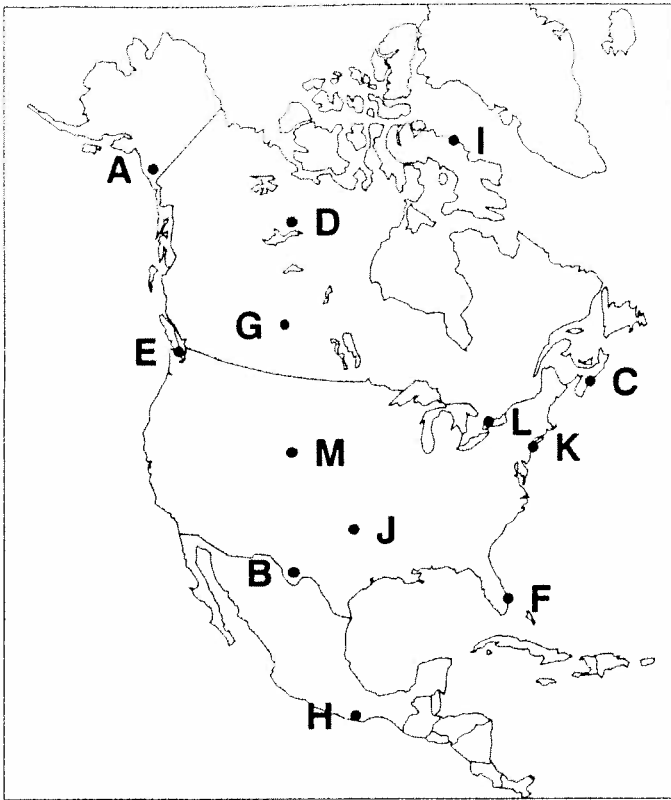
PHOTOCOPY THIS PAGE COMPLETE THE CHART

Category 3: Communication of Required Knowledge

|   |                          |  |
|---|--------------------------|--|
| 1 | <input type="checkbox"/> | rarely communicates with clarity and precision                     |
|   | <input type="checkbox"/> | rarely uses appropriate terminology, vocabulary, and symbols       |
| 2 | <input type="checkbox"/> | sometimes communicates with clarity and precision                  |
|   | <input type="checkbox"/> | sometimes uses appropriate terminology, vocabulary, and symbols    |
| 3 | <input type="checkbox"/> | usually communicates with clarity and precision                    |
|   | <input type="checkbox"/> | usually uses appropriate terminology, vocabulary, and symbols      |
| 4 | <input type="checkbox"/> | consistently communicates with clarity and precision               |
|   | <input type="checkbox"/> | consistently uses appropriate terminology, vocabulary, and symbols |

Student Name →

Today's Date →



**INSTRUCTIONS:** Read for understanding pages 2 and 3.  
1. What climate factor(s) affect each location on the map to the left. Place a check mark (✓) in the appropriate box.

|   | Latitude | Proximity to Bodies of Water | Prevailing Wind Systems | Ocean Currents | Air Masses |
|---|----------|------------------------------|-------------------------|----------------|------------|
| A |          |                              |                         |                |            |
| B |          |                              |                         |                |            |
| C |          |                              |                         |                |            |
| D |          |                              |                         |                |            |
| E |          |                              |                         |                |            |
| F |          |                              |                         |                |            |
| G |          |                              |                         |                |            |
| H |          |                              |                         |                |            |
| I |          |                              |                         |                |            |
| J |          |                              |                         |                |            |
| K |          |                              |                         |                |            |
| L |          |                              |                         |                |            |
| M |          |                              |                         |                |            |

2. Calculate the outside air temperature for each altitude.

10,000 m =

7,500 m =

3,000 m =

500 m =

Air temperature at ground is 20° C

Answer the following comprehension questions.

3. Define Latitude.

\_\_\_\_\_

\_\_\_\_\_

4. What two components does Latitude control?

\_\_\_\_\_

\_\_\_\_\_

5. Compare these sun angles; 30 and 90 degrees. Which angle will have a hotter climate? Why?

\_\_\_\_\_

\_\_\_\_\_

6. Define the Environmental Lapse Rate.

\_\_\_\_\_

\_\_\_\_\_

7. What type of air mass carries the most moisture?

\_\_\_\_\_

\_\_\_\_\_

8. Study the small map of Canada on page 3, under air mass. What air masses affect Ontario the most in the summer?

\_\_\_\_\_

\_\_\_\_\_

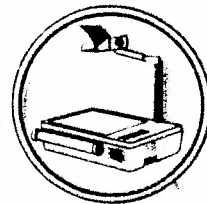
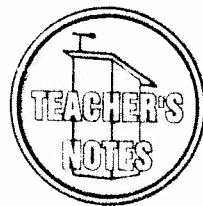


# Topic 2: Patterns in Physical Geography (Gr. 7)

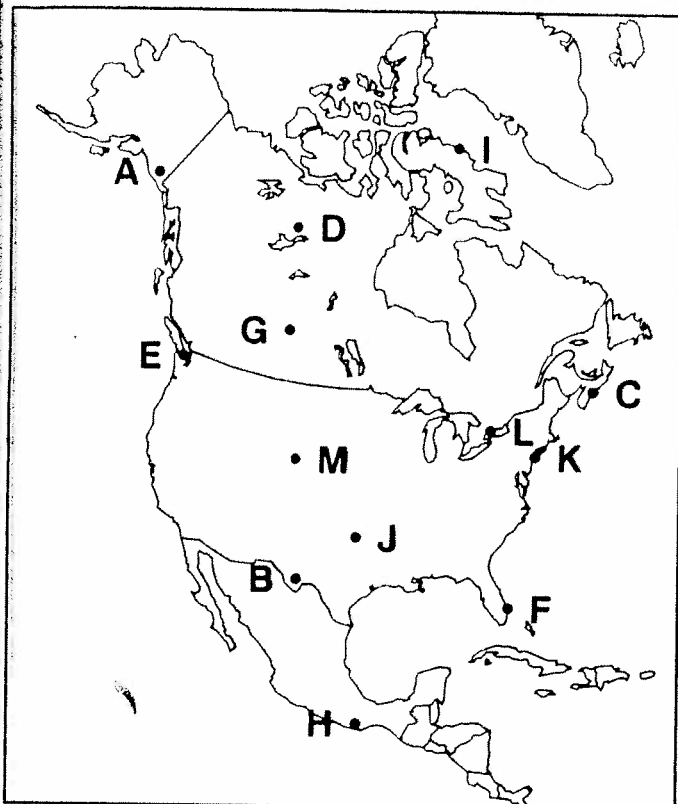
## Unit II: World Climate Patterns

### Factors Affecting World Climate

#### Study Organizer - Teacher's Answers (page 5)




Student Name: \_\_\_\_\_ Today's Date: \_\_\_\_\_

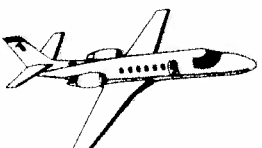



**INSTRUCTIONS:** Read for understanding pages 2 and 3.  
 1. What climate factor(s) affect each location on the map to the left. Place a check mark (✓) in the appropriate box.

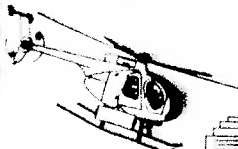
|          | Latitude | Proximity to Bodies of Water | Prevailing Wind Systems | Ocean Currents                | Air Masses |
|----------|----------|------------------------------|-------------------------|-------------------------------|------------|
| <b>A</b> | ✓        | ✓                            | ✓                       | ✓                             | ✓          |
| <b>B</b> | ✓        |                              | ✓                       |                               | ✓          |
| <b>C</b> | ✓        | ✓                            |                         | Ocean Currents cause fog only | ✓          |
| <b>D</b> | ✓        |                              | ✓                       |                               | ✓          |
| <b>E</b> | ✓        | ✓                            | ✓                       | ✓                             | ✓          |
| <b>F</b> | ✓        | ✓                            |                         | ✓                             | ✓          |
| <b>G</b> | ✓        |                              | ✓                       |                               | ✓          |
| <b>H</b> | ✓        | ✓                            | ✓                       | ✓                             | ✓          |
| <b>I</b> | ✓        | Water too cold to effect     | ✓                       | Labrador Current too cold     | ✓          |
| <b>J</b> | ✓        |                              | ✓                       |                               | ✓          |
| <b>K</b> | ✓        | ✓                            |                         | Gulf Stream warms winter      | ✓          |
| <b>L</b> | ✓        |                              | ✓                       |                               | ✓          |
| <b>M</b> | ✓        |                              | ✓                       |                               | ✓          |

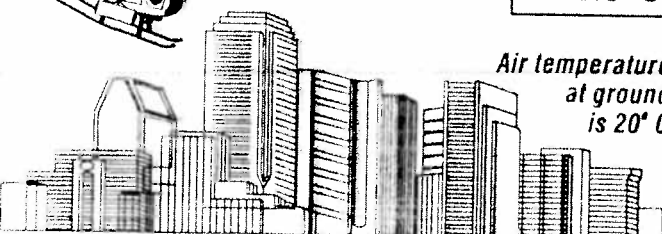
2. Calculate the outside air temperature for each altitude.

 10,000 m = **- 46.6° C.**

 7,500 m = **- 30° C.**

 3,000 m = **0° C.**

 500 m = **+ 16.6° C.**

 Air temperature at ground is 20° C

Answer the following comprehension questions.

- Define Latitude.  
 Lines of Latitude, measured in degrees, are imaginary lines running East-West around the Earth
- What two components does Latitude control?  
 Latitude controls both the angle at which the sun's rays strike the Earth's and the duration of daylight
- Compare these sun angles; 30 and 90 degrees. Which angle will have a hotter climate? Why?  
 90 degree will be hotter because more heat is absorbed, more sunlight hours, and longer days
- Define the Environmental Lapse Rate.  
 The cooling rate of air temperature with vertical ascent (1 degree Celsius for 150 metres in elevation)
- What type of air mass carries the most moisture?  
 A hot air mass
- Study the small map of Canada on page 3, under air mass. What air masses effect Ontario the most in the summer?  
 Continental Air, Tropical Air.