## *Teaching Activity: Climate Ratios*

***Introduction:*** To describe the moisture side of climate it is necessary to compare the **precipitation (P)** with the **potential evapotranspiration ($E_p$)** for the region. One way to do this is to express the relationship between them as a ratio using the formula: **Climate ratio = $P/E_p$**. When the potential evaporation is greater than yearly precipitation, this ratio is less than 1. When precipitation is greater than evapotranspiration, the ratio is greater than 1.

P = **precipitation** (in mm) or the amount of moisture available for evapotranspiration, Evapotranspiration is the combined process of evaporation and plant respiration.

$E_p$= **potential evapotranspiration** (in mm) or the amount of moisture needed for evapotranspiration. This value increases as temperature and plant life increase.

The table below shows how climate ratios are used to determine climate type:

| $P/E_p$ | Climate Type |
|---|---|
| Less than 0.4 | Arid |
| 0.4–0.8 | Semiarid |

| $P/E_p$ | Climate Type |
|---|---|
| 0.8–1.2 | Subhumid |
| Greater than 1.2 | Humid |

In the following examples, it is shown how climate ratios are calculated and then used to determine climate types:

**Example #1: Phoenix, AZ**
**P= 191 $E_p$ = 1157**
**$P/E_p$ =191/ 1157 =0.17**
***Climate type:* Arid**

**Example #2: New Orleans, LA**
**P= 1543 $E_p$ = 1118**
**$P/E_p$ = 1543/1118 = 1.4**
***Climate type:* Humid**

***Objective:***

- To understand the relationship between precipitation and potential evapotranspiration in classifying climate types;
- To use climate ratios to classify climates into four types: arid, semiarid, subhumid and humid;

***Important Terms***: Climate, precipitation, evapotranspiration, ratio;

***Materials:*** Copy of Student Activity Sheet, paper, pencil, calculator;

***Procedure:***

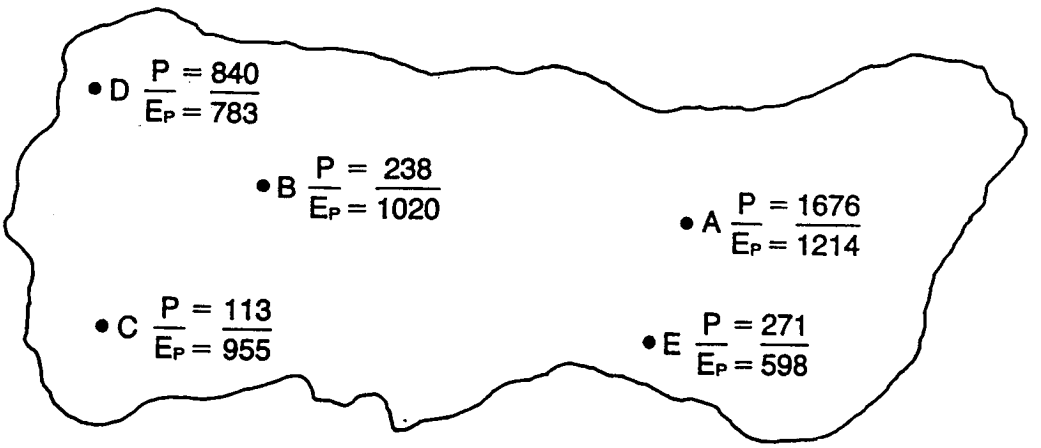
1. Read through and discuss the ***Introduction*** with the class.
   - Explain the formula and what it represents.
   - Go over the two examples in the ***Introduction.***
   - Provide other examples if necessary.

2. Present the **Imaginary Continent of Molen** to the class and discuss the information in the diagram.
   - The letters on the map represent cities on the continent.

3. Instruct students to calculate the climate ratio for each of the cities and to use the table to determine the climate types.

4. When students have completed **Part I** they should complete **Part II** in which they will classify locations using the climate ratios provided.

**Imaginary Continent of Molen:**



## *Student Activity Sheet #1: Climate Ratios*

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***Objective:***

- To understand the relationship between precipitation and potential evapotranspiration in classifying climate types;
- To use climate ratios to classify climates into four types: arid, semiarid, subhumid and humid;

***Procedure:***

1. Read and discuss the **Introduction** with the your teacher.
   - Take notes on the formula, what it means and how to use it to calculate climate ratios.

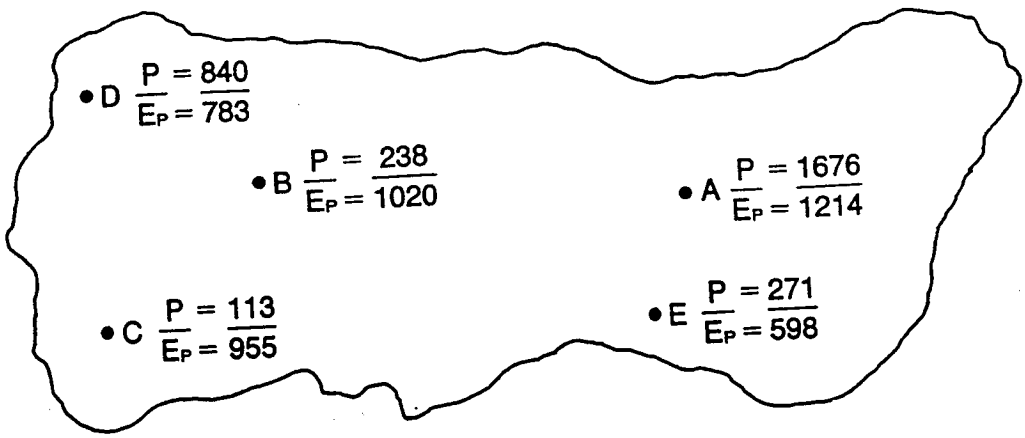
2. Study the map of the **Imaginary Continent of Molen.**

3. Calculate the climate ratio for the cities on the map and use them to determine the climate types.

4. Do the calculations in the spaces provided on the activity sheet and record your answers in the spaces provided.

5. When you have completed **Part I**, go on to **Part II**.

**Imaginary Continent of Molen:**



*Student Activity Sheet #2:*

Part I: Calculating Climate Ratios:

1. City A

Climate ratio_____
Climate type _____

2. City B

Climate ratio _____
Climate type _____

3. City C

Climate ratio_____
Climate type_____

4. City D

Climate ratio_____
Climate type _____

5. City E

Climate ratio_____
Climate type _____

Part II: Determine the type of climate by the climate ratios given for each of the locations below:

| | Location | Climate ratio | Climate type |
|---|---|---|---|
| 1. | W | 0.64 | _____ |
| 2. | X | 1.43 | _____ |
| 3. | Y | 0.08 | _____ |
| 4. | Z | 1.16 | _____ |
| 5. | AA | 0.3 | _____ |
| 6. | BB | 1.7 | _____ |
| 7. | CC | 1.55 | _____ |
| 8. | DD | 0.45 | _____ |
| 9. | EE | 1.19 | _____ |
| 10. | FF | 2.0 | _____ |