

4. Elevation

Calculating Changes in Temperature of a Rising Air Mass

STEP 1 How far will the air rise before condensation begins?

ANSWER: $900 - 0 = 900$ m

STEP 2 How much will the temperature drop in this distance?

ANSWER: Rate of cooling is $1\text{C}^\circ/100$ m. Therefore, the temperature will drop $900/100 \times 1\text{C}^\circ = 9 \times 1\text{C}^\circ = 9\text{C}^\circ$

STEP 3 How far will the air mass rise after condensation begins?

ANSWER: $1400 - 900 = 500$ m

STEP 4 How much will the temperature drop in this distance?

ANSWER: Rate of cooling when condensation occurs is $0.6\text{C}^\circ/100$ m.

$500/100 \times 0.6\text{C}^\circ =$
 $5 \times 0.6\text{C}^\circ = 3\text{C}^\circ$

STEP 5 What will the temperature be at the top of the mountain?

ANSWER: $26 - (9 + 3) = 14\text{C}^\circ$

1400 m Temp = ?

Sea Level 0 m Temp = 26C°

Condensation begins 900 m

Wet air

Dry air

Air mass rising over mountain

Instructions: Using the following scenario, determine the change in temperature of the air mass rising over Mount Garibaldi. Record your work for each step in the space provided. Draw a diagram of Mount Garibaldi in the space below.

Mount Garibaldi, north of Vancouver, is 2700 meters high. The temperature at the water front in Vancouver is 24°C. What will be the temperature of the air at the mountain top if condensation starts at 1200 meters?

Steps:

Diagram of Mount Garibaldi: