## RATES – PART 1

- 1. What is the equation for rate of change?
- 2. If the greenhouse effect causes the Earth's average temperature to increase by a total of 3°F between the years 1960 and 1990, what is the rate of temperature change in degrees per year (°F/year)?
- 3. After a series of earthquakes, a landsat satellite computes that California is 15 cm less wide than it was 3 years ago. What is the rate of change of California's width?
- As hurricane Felix neared the U.S. coast, air pressure dropped from 996 4. millibars to 980 millibars in 8 hours. Calculate the rate of air pressure change in mb/hour.
- 5. A category 5 tornado (very violent) passes over a hard core weather monitor. The air pressure drops from 994mb to 988 in 3 minutes. What is the rate of change?
- 6. Which has a faster rate of air pressure fall, a hurricane or a tornado? (Hint: you have to convert hours to minutes)
- 7. Erosion typically wears the Hawaiian volcano Mono Loa down about 20 cm in 5 years. Lava flows build the volcano up about 10 cm every time there is an eruption. Mono Loa erupts about once every 2 years. Is the volcano growing or wearing down? Prove your answer mathematically!

## RATES – PART 2

- 1. Write the equation for a gradient.
- 2. Write the equation for a rate of change.
- 3. If a mountain grows at a rate of 400 cm in 100 years, what is its growth rate?
- Niagara Falls is worn down by 900 cm in a month. What is its erosion rate per 4. day (assume a month is 30 days long)?
- 5. A hiker gains 250 meters in altitude by climbing a mountain from the valley. The peak is 5 km from the valley. What is the gradient of the mountain side?
- 6. The temperature from one side of a classroom is 27°C while on the other it is 19°C. The distance between the two thermometers is 16 meters. What is the temperature gradient?
- 7. Two cities are separated by a distance of 500 km. In one city, the barometric pressure (air pressure) is 990 mb, while the other city measures 1040 mb. What is the pressure gradient?