This poster shows a sequence of phenomena that could help students understand seasonal changes in temperature patterns on the Earth. For each phenomenon, students may need considerable help in:

- understanding what was measured,
- describing the temperature patterns, and
- relating the temperature patterns to information about the different locations (in this case, their distances from the equator).

Similar instructional sequences would be needed to develop students’ understanding of the relationship between mean monthly temperature patterns and altitudes and between mean monthly temperature patterns and proximity to an ocean.

### Key Idea #1 (Yearly Temperature Cycles)

The temperature in any location on the Earth’s surface tends to rise and fall in a somewhat predictable cycle over the course of a year. Students should know that the temperature in any one place tends to rise and fall in a fairly predictable yearly cycle. They should know that at a certain time of year one place may be experiencing higher temperatures while another place is experiencing lower temperatures. They should also know that places at higher elevations, such as mountainous places, experience less extreme temperature ranges than places at lower elevations. In the northern hemisphere, the monthly temperature range tends to be higher during winter months (January, February, and March) and lower during summer months (June, July, and August). Students should be able to identify these relationships on a graph showing mean monthly temperatures over the course of the year (Key Idea #1, benchmark 12D/E4).

### Key Idea #2 (Geographic Factors Influence Temperature Cycles)

The yearly temperature cycle of a location depends on how far north or south of the equator it is, how high it is, and how near to oceans it is. Students should know that the yearly temperature pattern of any given location is determined by its latitude and its proximity to an ocean.

#### Phenomena to Help Middle School Students Understand Seasonal Changes in Temperature Patterns on the Earth

The following phenomena can be used to help students understand seasonal changes in temperature patterns on the Earth:

- **Daily Temperature in Denver Over the Course of the Year (1995–2006)**
- **Average Monthly Temperature of Four Cities Spread Out North to South**
- **Daily Temperature in Denver Over the Course of the Year (2000)**

#### References