

## TEACHER ANSWER SHEET



### **Answer Key and Scoring Rubric** **Student Pre-Test (Middle School)** **Score 0 - 12 points**

#### **Introduction**

Pretend that you are a travel agent and have been asked to arrange a trip for your class during the month of December. The students have selected two cities (Springfield and Metropolis) and have asked you to make the final choice. Your teacher has only one requirement: You must select the warmest city.

Unfortunately, you do not know what the temperature for either of these cities will be. Your teacher has informed you that there is a way to determine the temperature by comparing its location with other cities around the world. Therefore, your first job is to determine the trend. You then contacted some of your friends around the world and asked them to record their temperature over the same week and average it. Each of your friends from the following schools sent this information:

| School               | City       | State      | Country     | Latitude | Longitude | Temperature (°C) |
|----------------------|------------|------------|-------------|----------|-----------|------------------|
| Pinehurst            | Albany     | Auckland   | New Zealand | -36      | 174       | 19               |
| Kippa-Ring           |            | Queensland | Australia   | -27      | 153       | 25               |
| Mareeba              |            | Queensland | Australia   | -17      | 154       | 34               |
| Mazapan School       | La Ceiba   | Atlantida  | Honduras    | 16       | -87       | 25               |
| Kfar-Shmriyau Rispon | Herzelia   |            | Israel      | 32       | 35        | 12               |
| George Washington    | Cleveland  | Ohio       | USA         | 41       | -81       |                  |
| Badger Road          | North Pole | Alaska     | USA         | 55       | -147      | 0                |

Students from the George Washington School forgot to average their daily temperature and instead sent you the temperature for each of the five days. This means that you will have to average it and insert it into the table above before you can move to the next step.

|                        | Monday | Tuesday | Wednesday | Thursday | Friday |
|------------------------|--------|---------|-----------|----------|--------|
| Temperature (°Celsius) | 4      | 5       | 7         | 3        | 6      |

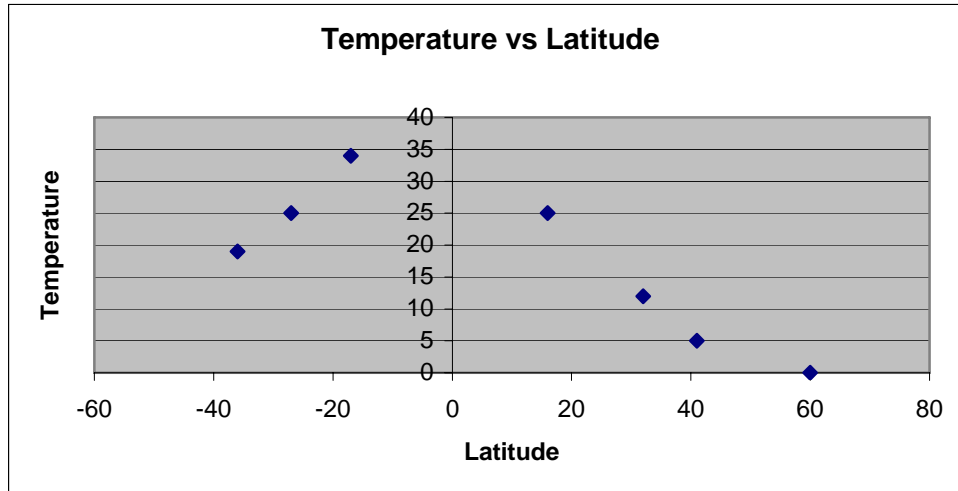
1. What was the Average Temperature for the week? 5 °C (2 point)

## TEACHER ANSWER SHEET

### Graph the Results

The next step is to plot the different schools using Latitude and the Temperature in degrees Celsius. Use the graph below to plot all seven schools. One example, the Pinehurst School from New Zealand, has already been completed for you.

GRAPH 1



2. What trend have you noticed? **The closer to the equator the warmer the temperatures. In general, December the locations in the northern latitudes have lower temperatures when compared to locations in the southern hemisphere that are same distance from the equator.**

3. Why do you think this is so? **Locations at the equator receive the most direct sunlight. In December, the northern hemisphere is tilted away from the sun and therefore it receives less direct sunlight than corresponding locations in the southern hemisphere (which is tilted toward the sun).**

#### Scoring for Graph and questions 2 and 3

**Full Credit (5 points)** Graph is entirely complete and accurate and student has correctly identified the trend and the reason for it.

#### **Partial Credit (3 points)**

Graph is entirely complete and accurate, but student does not show clear understanding of the relationship between temperature and latitude.

#### **Partial Credit (1 point)**

Graph partially completed or completed, but conclusions are erroneous. Student attempts to explain trend, but response is not logical

## TEACHER ANSWER SHEET

### Making the Choice

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Now that you've determined the trend, you are prepared to decide which of the two choices selected by your class is the warmest. The two cities that were selected are:

City: Springfield  
Latitude: 47° North

City: Metropolis  
Latitude: 12° South

4. Add these two cities to the graph on the previous page.

**Score: 2 points, no partial credit.**

5. Which of the two cities is the warmest? Metropolis

6. Why? (Please base your results using information from the graphs above).

**The graph indicates that temperature decreases as the latitude increases and vice versa. Metropolis is in the lower latitudes (southern hemisphere) where the temperatures appear to be higher in December. If you plot Metropolis on the graph you find that it should have a temperature around 35 deg. C. Springfield would be around 3 or 4 deg. C. Thus Metropolis must be warmer.**

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**Scoring:**

**Full Credit:**

**(3 points)** Student answers correctly, indicates the temperature that the two cities would be at based on the graph and references the trend.

**Partial Credit:**

**(2 points)** Student answers correctly based on the graph and references the trend.

**(1 point)** Student answers correctly, but does not reference the graph.

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## TEACHER ANSWER SHEET

### Follow-up Questions

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Add this city to the graph on the previous page:

|              |             |
|--------------|-------------|
| City:        | Millville   |
| Latitude:    | 5° North    |
| Temperature: | 10° Celsius |

Why do you think this city is different than the others? What are some factors that might affect the temperature?

**Millville should be much warm based on where it is located (near the equator). Some other factor must be lowering the temperature. Factors that might affect the temperature are altitude (e.g. at the top of a mountain) and proximity to a large body of water.**

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Scoring:

**Full credit (3 points)** Student plots city correctly, mentions the location close to the equator, and gives two other factors that might affect temperature

**Partial credit**

**(2 points)** Student plots the city correctly, mentions the location close to the equator, and gives one other factor that might affect temperature.

**(1 point)** Student plots the city correctly and mentions that the city is close to the equator.

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