MATH APPLICATION ACTIVITY:
EARTH'S HEAT BUDGET

Insolation that Earth receives undergoes a cyclical change during the year at most places on Earth's surface. This change in intensity and duration of insolation has an effect on Earth's surface temperatures.

The energy received each month can be compared to the energy radiated back to the atmosphere by Earth's surface. To understand this relationship, imagine a situation in which incoming solar energy is money received and *deposited* into a bank account. In this comparison, energy emitted by Earth is money *withdrawn* from the bank account in order to meet expenses. The *balance* is the remaining energy after the deposits and withdrawals and represents *average* surface Earth temperature for each month. In order to simplify the model, actual energy values have not been used. Values have been assigned to the monthly deposits and withdrawals that show the relationships of the actual values: energy is simply labeled as "energy units."

DISCUSSION QUESTIONS:

1. In which month does Earth receive the most insolation?

2. During which month does the maximum temperature occur?

3. Do the months of maximum insolation and temperature coincide?

4. In which month does Earth receive the least insolation?

5. In which month does minimum temperature occur?

6. Do the months of minimum insolation and temperature coincide?

7. List the months during which Earth experienced an energy surplus.

8. During the months that have a surplus of heat energy, temperatures
        a. decrease   b. increase   c. are not affected

9. In the space below, list the months during which Earth experiences an energy deficit.

10. During the months that have a deficit of heat energy, temperatures
    a. decrease   b. increase   c. are not affected

11. The time when maximum temperature occurs is closest to

    a. Minimum surplus   b. Maximum deficit   c. Radiative Balance

12. The time when minimum temperature occurs is closest is the:

    a. Maximum surplus   b. Minimum deficit   c. Radiative Balance.

13. Based on the slope of the temperature line on the graph, as the amount of surplus increases, the rate of temperature increase:
    a. decreases   b. increases   c. is not affected

CONCLUSION: Explain why don't the dates of maximum and minimum temperatures coincide with the dates of maximum and minimum insolation?

Student Sheet 3

REPORT SHEET:

MONTH	Energy Absorbed (Deposited)	Energy reradiated (Withdrawn)	Difference in deposits and withdrawals	Surface temperature (Balance)
NOV	100	120		
DEC	90	115		
JAN	100	110		
FEB	110	105		
MAR	120	110		
APR	130	115		
MAY	140	120		
JUNE	150	125		
JULY	140	130		
AUG	130	135		
SEPT	120	130		
OCT	110	125		
NOV	100	120		

ANALOGY GRAPH: