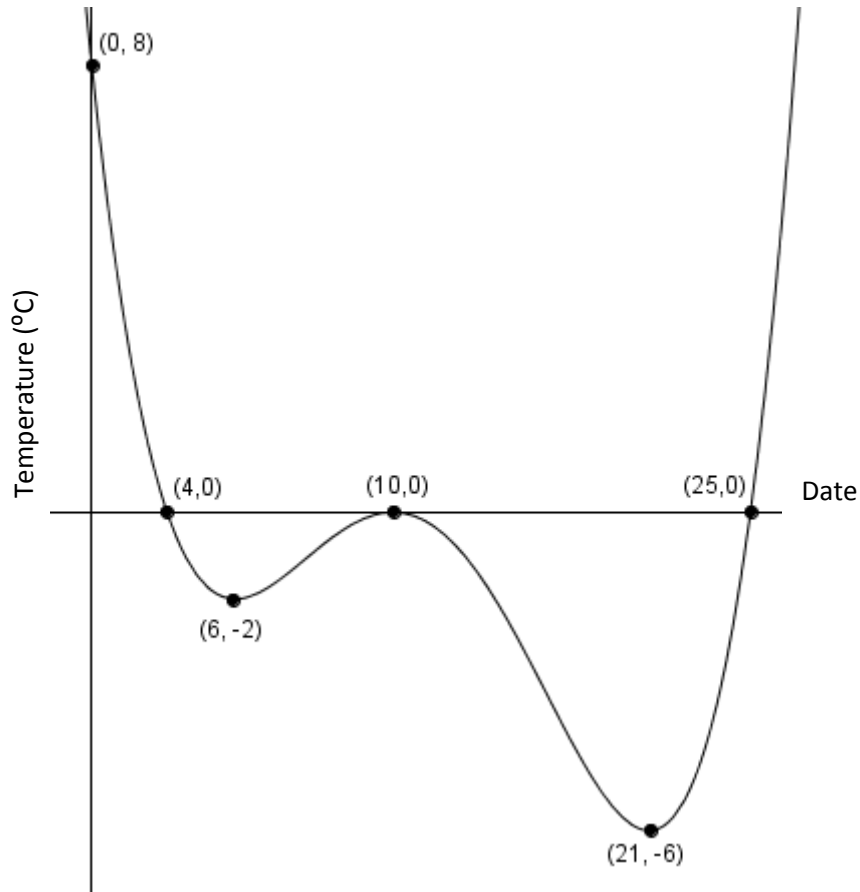


Standard(s) of Learning

- All.6 The student will recognize the general shape of function (absolute value, square root, cube root, rational, polynomial, exponential, and logarithmic) families and will convert between graphic and symbolic forms of functions. A transformational approach to graphing will be employed. Graphing calculators will be used as a tool to investigate the shapes and behaviors of these functions.
- All.7 The student will investigate and analyze functions algebraically and graphically. Key concepts include
- a) domain and range, including limited and discontinuous domains and ranges;
 - b) zeros;
 - c) x - and y -intercepts;
 - d) intervals in which a function is increasing or decreasing;
 - e) asymptotes;
 - f) end behavior.
- All.8 The student will investigate and describe the relationships among solutions of an equation, zeros of a function, x -intercepts of a graph, and factors of a polynomial expression.

Heat Wave

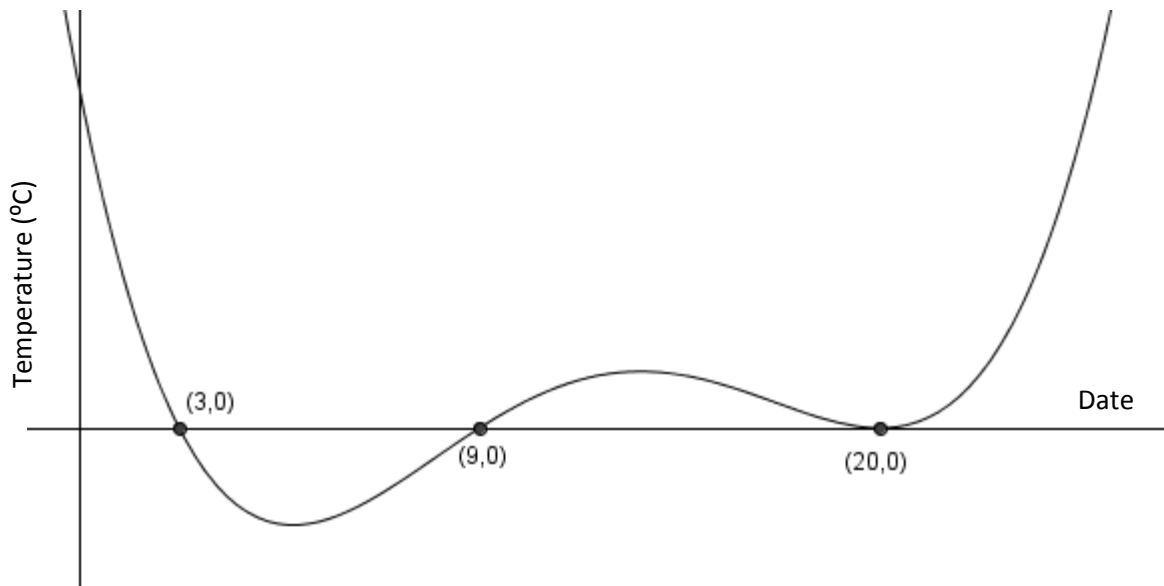
The town of Frostburg experienced a bit of a heat wave during January of this year. The graph below shows the curve of best fit that represents the low temperature for every day in January.



A newspaper journalist is writing a story on the weather and needs to report some information. He needs a bit of guidance with interpreting the graph.

- 1) Write a few sentences describing the key characteristics of the graph as it relates to the context of the problem. Be sure to include domain, range, intervals where the function increases and decreases, x- and y-intercepts, and any other important information.

The graph below shows the curve of best fit that represents the low temperature for every day in February.



2) Three different models have been proposed that could be used to determine the temperature for a particular date in February. The models are given below:

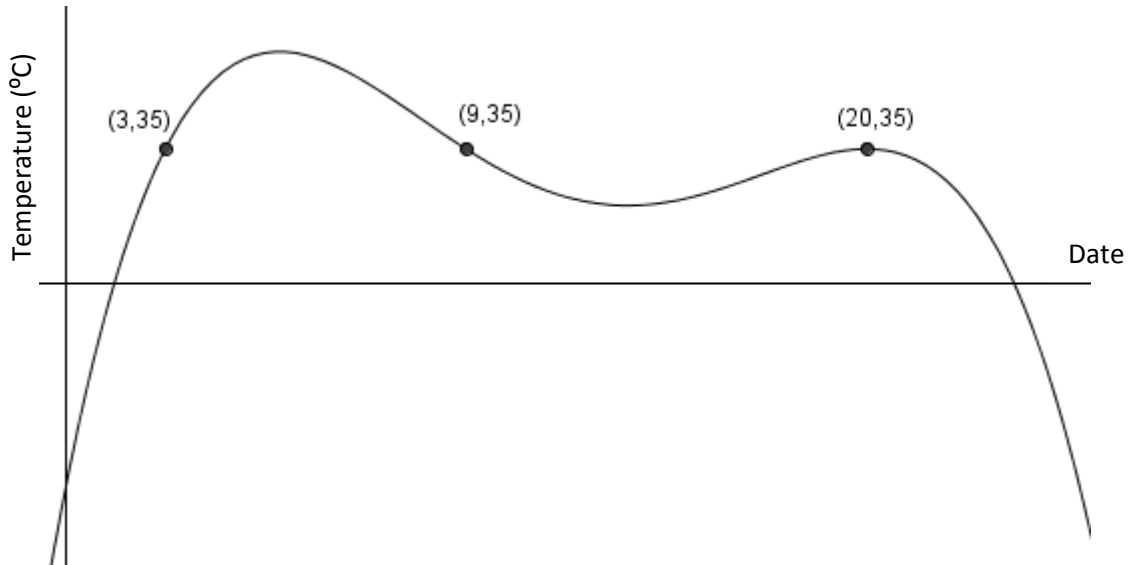
Model 1: $y = ax^2 + bx + c$

Model 2: $y = a(x + 3)(x + 9)(x + 20)$

Model 3: $y = \frac{a}{(x-3)(x-9)^2(x-20)}$

None of these models are completely appropriate for the graph. Explain what is incorrect with each of the models and then suggest and justify a better model.

The weather in July showed a related pattern to the weather in February. The curve of best fit for July is shown below:



- 3) Explain the relationship between the graph for February and the graph for July. Use that relationship to create an equation for the temperatures in July.