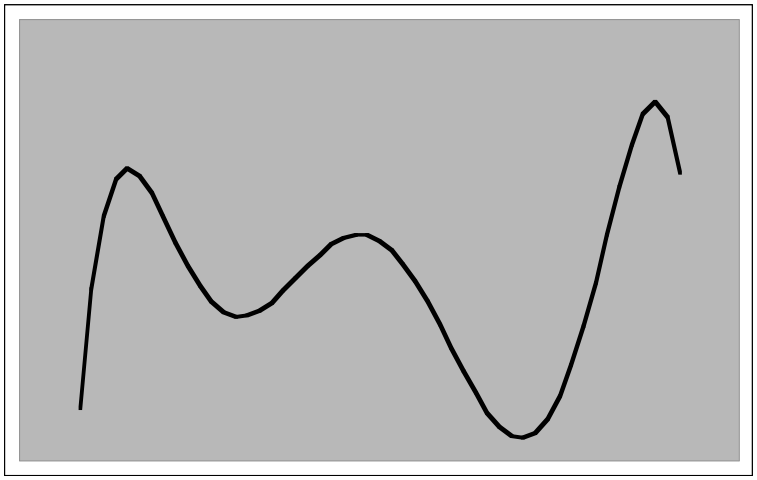
Polynomial Roller Coasters

The shape of a roller coaster could be modeled by a polynomial function, such as this one:

$$y = ax^6+bx^5+ cx^4+dx^3+ex^2+ fx + g.$$

Here is an example:



$$y =-.015x^6+.01x^5+ 14x^4+20x^3-3000x^2-10000x + 300000.$$

(Domain: $-25 \le x \le 25$)

Use a graphing calculator or spreadsheet program to investigate the effects of the coefficients on the shape of the roller coaster, as follows:

1. Change the "*f*" coefficient from "–10,000" to "–20,000." What is the effect on the roller coaster? Why?

   _____

   _____

   _____

2. What do you think would happen if you changed "*f*" to "-30,000"? Try it and explain what happened.

   _____

   _____

   _____

3. What happens if you change *"f"* to "0"? Explain.

_____

_____

_____

4. Change all coefficients to "0" except for *"d"* (leave it at "20"). Describe the result.

_____

_____

_____

5. Now change *"d"* to "-20" (leaving all other coefficients equal to zero), and create the graph. Explain the results.

_____

_____

_____

6. Leave *d = -20*, and change *"f"* from "0" to "10000." Try several other values of *"f"*, to see the effect. Describe the results.

_____

_____

_____

7. Set *"a"* and *"b"* equal to zero, and see if you can find values for the other coefficients that produce a graph of this shape: