The Roller Coaster of Calculus

“If you can ride a roller coaster--or even imagine riding one--you can learn calculus.” --Mr. D.A.

To introduce differential calculus in an intuitive way, I use the “Roller Coaster” graph. First I train students how to ride a roller coaster:

- when the coaster goes uphill, we scream “oooohhhh” (the anticipatory scream);
- when the coaster goes downhill, we scream “aaaaahhhhhh!!!!!” (the cathartic fear scream);
- the steeper the hill, the louder the scream;
- if the coaster is ever level (even for a moment) we should be silent.

We practice this using some of the functions in the GeoGebra graph, as Dora’s coaster is animated across the screen. In the following lessons (after I apologize to the teacher next door for all the noise), we connect these different screams to concepts of tangent lines: tangent with positive/negative slope, horizontal tangent, tangent with greater/lesser slope. Later, after developing the concept of the derivative, we attach these same concepts to the value of the derivative at point x. When students are struggling with a calculus question, I remind them to ask, “What is Dora doing at this point on the graph?”