

## Rollercoaster

70 points

Due: 4/16/18 (A day classes) 4/17/18 (B day classes)



Put those safety restraints because you are going to be designing your own roller coaster!

(28 points) Part 1:

The diagram: You will be creating a paper drawing of your roller coaster. The roller coaster has to have at least one of each of the following shapes: parabola, circle, hyperbola and an ellipse of different heights. Your rollercoaster must also have **at least** 6 shapes. The equation for each curve must be generated and shown on your diagram. Keep your measurements all on the same scale, so you can insert one x and y axis anywhere on your drawing. You will need to have a separate piece of paper listing the equations and vertices. Your roller must also have a theme.

(12 points) Part 2:

Calculation of speed. A rider's maximum speed  $v$  (in feet per second) at any downhill portion of a rollercoaster, with a height of  $h$  feet, can be modeled by the equation  $v = 8\sqrt{h}$ . We are going to assume that the friction of the rollercoaster on the track is 5%. At any downhill time, the speed is lowered by friction, and so you must decrease your result by 5%. Calculate the speed of your rollercoaster at **6 different places**.

(30 points) Part 3:

3-D Model: Create a physical 3-D model of your rollercoaster out of any material that you choose. It doesn't have to actually run, but it needs to follow your scale diagram in dimensions. No roller coaster tycoon or other computer programs! Make sure your roller coaster has a name, theme, decorations and is structurally sound.

You may work alone or with **ONE** partner who must be in your class period. Each person must turn in their own rubric attached to their paperwork. Your name(s) need to be in permanent ink on the base of your structure. The most creative rollercoaster will be given bonus points.