 Greenwood College

**Investigation 1– Roller Coaster Design**

***Marking key***

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Section 1 Clarifying the Problem

introduction

To design a roller coaster track ✓

That is practical or smooth ✓

And thrilling or visually appealing ✓

Total for Section 1 3 marks

Section 2 Relevant Information

Ascent gradient must be <1 unless cars are held on to the track ✓

Potential energy is converted to kinetic along the way ✓

Potential energy is greatest at the high point of the start.

Subsequent peaks must be lower than this point ✓

Finish point should be lower than the starting high point ✓ centripetal or centrifugal forces hold the cars on the track in a loop ✓ gradients have to be equal for sections at joining point for smooth transition ✓

All sections should be above ground, unless explained otherwise ✓

(marks for other relevant considerations allowed to a max of 5)

Total for Section 2 5 marks

Section 3 Method

Calculate gradients at the end of each section of track ✓

and make sure they are equal ✓

use known points to work out the exact formula for the section by simultaneous equations ✓

Total for Section 3 3 marks

Section 4 Use the Method

Section 1 start point gradient, end point gradient, correct sketch ✓✓✓

Section 2 start point gradient, end point gradient, correct sketch ✓✓✓

Section 3 start point gradient, end point gradient, correct sketch ✓✓✓

Section 4 start point gradient, end point gradient, correct sketch ✓✓✓

Section 5 start point gradient, end point gradient, correct sketch ✓✓✓

Additional type of function (to linear & quadratic) ✓

Total for Section 4 16 marks

Section 5 Communicate the Solution

Full graph featured – with correct scale and labelling of axes and sections ✓✓✓✓

Limitations & improvements :

Put in a loop ✓ make gradients steeper ✓

Add more features ✓ use an exponential decay function for a smooth finish ✓ go underground through a tunnel ✓

Do a bit more research to model other roller coasters ✓

(or other relevant considerations to a max of 6)

Total for Section 5 10 marks

Score \_\_\_\_ / 37

Less late submission penalty

Final score