

ALGEBRA 2: ROLLER COASTER POLYNOMIALS

Purpose:

In real life, polynomial functions are used to design roller coaster rides. In this project, you will apply skills acquired in our Polynomial Unit to analyze roller coaster polynomial functions and to design your own roller coaster.



Roller Coaster Design – your own roller coaster design report **MUST** be completed on a separate sheet of clean, neat, copy paper. All parts **MUST** be answered and clearly labeled.

Project Evaluation Criteria:

Your project will be assessed based on the following general criteria:

Roller Coaster Design Report & Poster – will be graded as follows

Roller Coaster design meets all minimum requirements	8 points
Clear and accurate response for each part 0-3 points	15 points
Professional appearance of your report	5 points
Creativity of Roller Coaster (poster & ride)	4 points
TOTAL POINTS	32 points

ROLLER COASTER DESIGN:

You have decided to become a structural engineer who specializes in roller coaster design. Your job is to design your own roller coaster ride. To complete this task, please follow these steps:

The amusement park you are designing for gave you the following coaster requirements:

- Your coaster ride must have at least 3 relative maxima and/or minima
- The ride length must be at least 2 minutes
- The coaster ride starts at 250 feet
- The ride dives below the ground into a tunnel at least once
- The ride must have one “bounce” (Multiplicity 2)
- The ride must have at least one “twist/swerve” (Multiplicity 3)
- The ride must hit ground level at least three times (Three real zeros)
- Your coaster must have a name

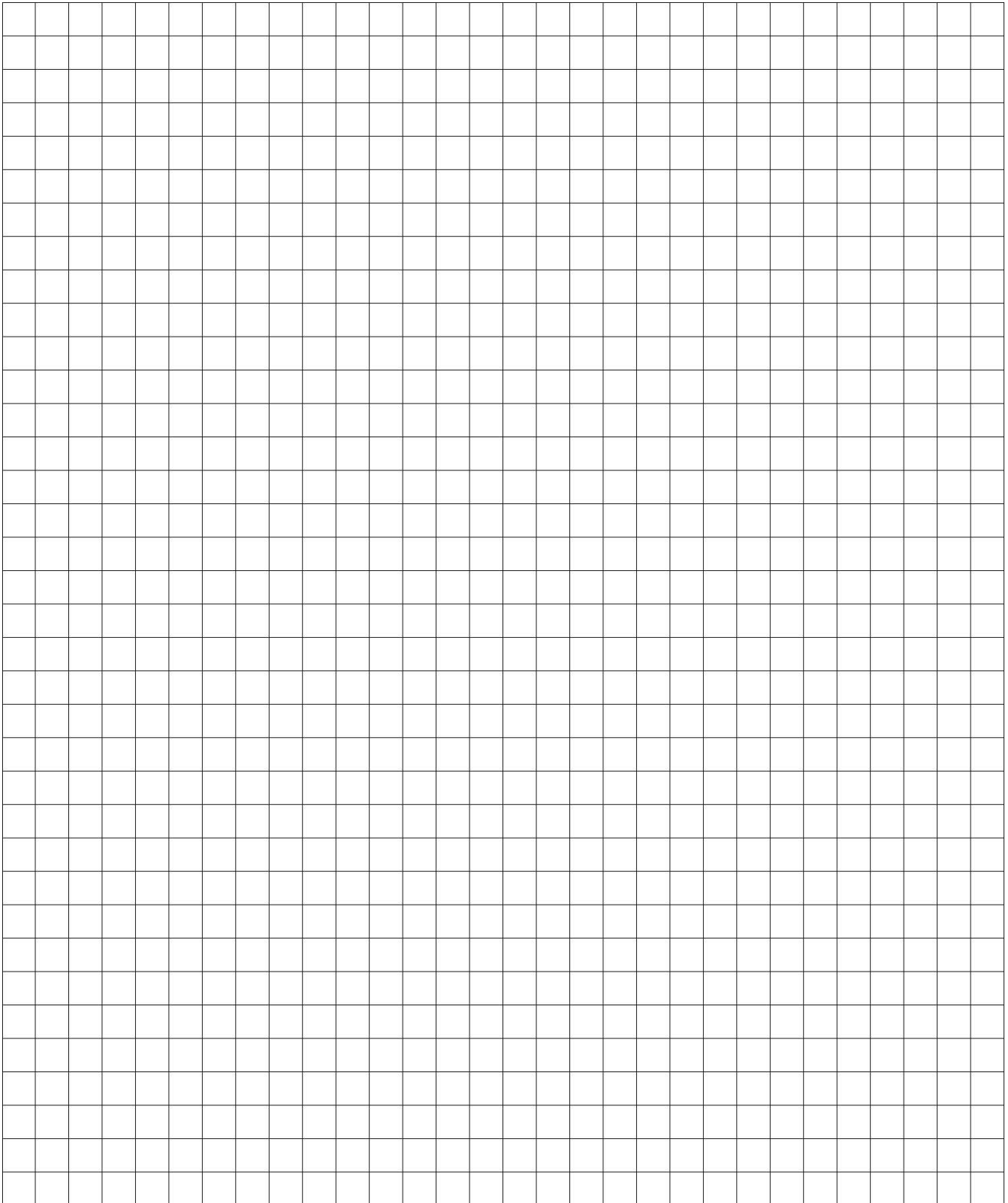
Also, the ride cannot have any loop-de-loops (inversions) as it wouldn't be a function

Your final project report must be professional in appearance. Use a clean sheet of copy paper to complete the following tasks. Write neatly (in pen) or type your report in complete sentences on your Roller Coaster Design. Label each part clearly. Your work **MUST** be neat, organized and must appear professional.

1. Write the completely factored form of your roller coaster polynomial function (with correct “a” value). Include accurate work showing how you found the “a” value.
2. List all zeros or roots of your polynomial; be sure to include at least one of each of the following on your design: one zero with multiplicity two, one zero with multiplicity three, and at least 3 real zeros. It might be necessary to go back to your design and modify it according to these zero requirements.
3. Describe the end behavior of your function and give a reason for this behavior.
4. Draw an accurate final graph of your polynomial on poster paper (provided). This graph should match the function you wrote in part 1.
5. State the domain & range of your graph in the context of the actual ride.

To help get you started, draw a rough draft sketch of your "roller coaster" ride on the coordinate plane provided.

Note: Be sure to illustrate your x-axis and y-axis scale to identify the length of the ride and the height of the ride you are designing. Make sure your design meets all the criteria listed above.



ROLLER COASTER POLYNOMIAL PROJECT

	Points Earned	Points Possible
<u>All requirements are met:</u> <input type="checkbox"/> Ride has at least 3 maxima/minima <input type="checkbox"/> Ride length is at least 2 minutes <input type="checkbox"/> Ride starts at 250 feet <input type="checkbox"/> Ride dives below the ground at least once <input type="checkbox"/> At least one zero with multiplicity two <input type="checkbox"/> At least one zero with multiplicity three <input type="checkbox"/> At least 3 real zeros <input type="checkbox"/> Roller Coaster Name		8
<u>Clear & Accurate Response</u> to each of the following:		
<ul style="list-style-type: none"> • Write the completely factored form of the roller coaster polynomial function. All work is shown to find “a” value. 		5
<ul style="list-style-type: none"> • List all zeros of the polynomial 		2
<ul style="list-style-type: none"> • Describe the end behavior of the function & give a reason for this behavior 		2
<ul style="list-style-type: none"> • Draw an accurate final graph on poster paper (matches equation) 		3
<ul style="list-style-type: none"> • State the domain & range of the graph in context 		3
<u>Professional appearance of the report:</u> <input type="checkbox"/> Report is written using complete sentences <input type="checkbox"/> All parts are clearly labeled <input type="checkbox"/> Final report is typed or written <u>neatly</u> in pen. <input type="checkbox"/> Final poster is neatly drawn <input type="checkbox"/> Final poster incorporates color well		5
<u>Creativity</u> <input type="checkbox"/> Overall poster design <input type="checkbox"/> How fun is the ride?		4
Total Points:		32

Comments: