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MEGA Math Function World – High School Edition

The Use of Linear and Parabolic Equations

Part 1: Thinking like a MEGA Mathematician

Directions: *Read each of the following statements exploring your mathematical reasoning. When prompted, describe how each type of graph affects the motion of the roller coaster ride. You may answer these in your STEM journal or paste this activity in your journal. Be sure your journal has a table of contents page in the beginning.*

1. Identify the following type of function in this amusement park ride:

    a. Linear
    b. Horizontal
    c. Vertical
    d. Parabola

Consider the changing shape of the ride How does this shape of the ride in the image affect the speed and experience of the riders in the cart?. _____

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Once the riders reach the top and go down, how does the steepness of the ride affect the motion of the riders in the cart? _____

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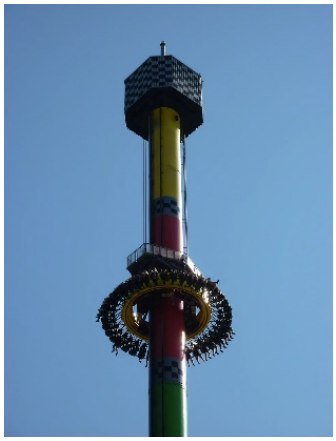
2. Identify the following type of line in this amusement park ride

   a. Linear
   b. Horizontal
   c. Vertical
   d. Parabola



Think back to Ms. Nguyen's lesson to Theo and Kevin. What types of values change on a graph with this type of shape, and which values stay the same? _____

As the roller coaster releases the riders, how does the shape of the ride affect the motion of the riders in the cart compared to that in number 1? _____

_____

_____

3. Identify the following type of line in this amusement park ride:

   a. Linear
   b. Horizontal
   c. Vertical
   d. Parabola

As the roller coaster goes up, how does the steepness of the ride affect the motion of the riders in the cart? _____

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4. Identify the following type of line in this amusement park ride:

   a. Linear
   b. Horizontal
   c. Vertical
   d. Parabola

As this roller coaster releases forward, how does the shape of the ride affect the motion of the riders in the cart compared to that in number 3? _____

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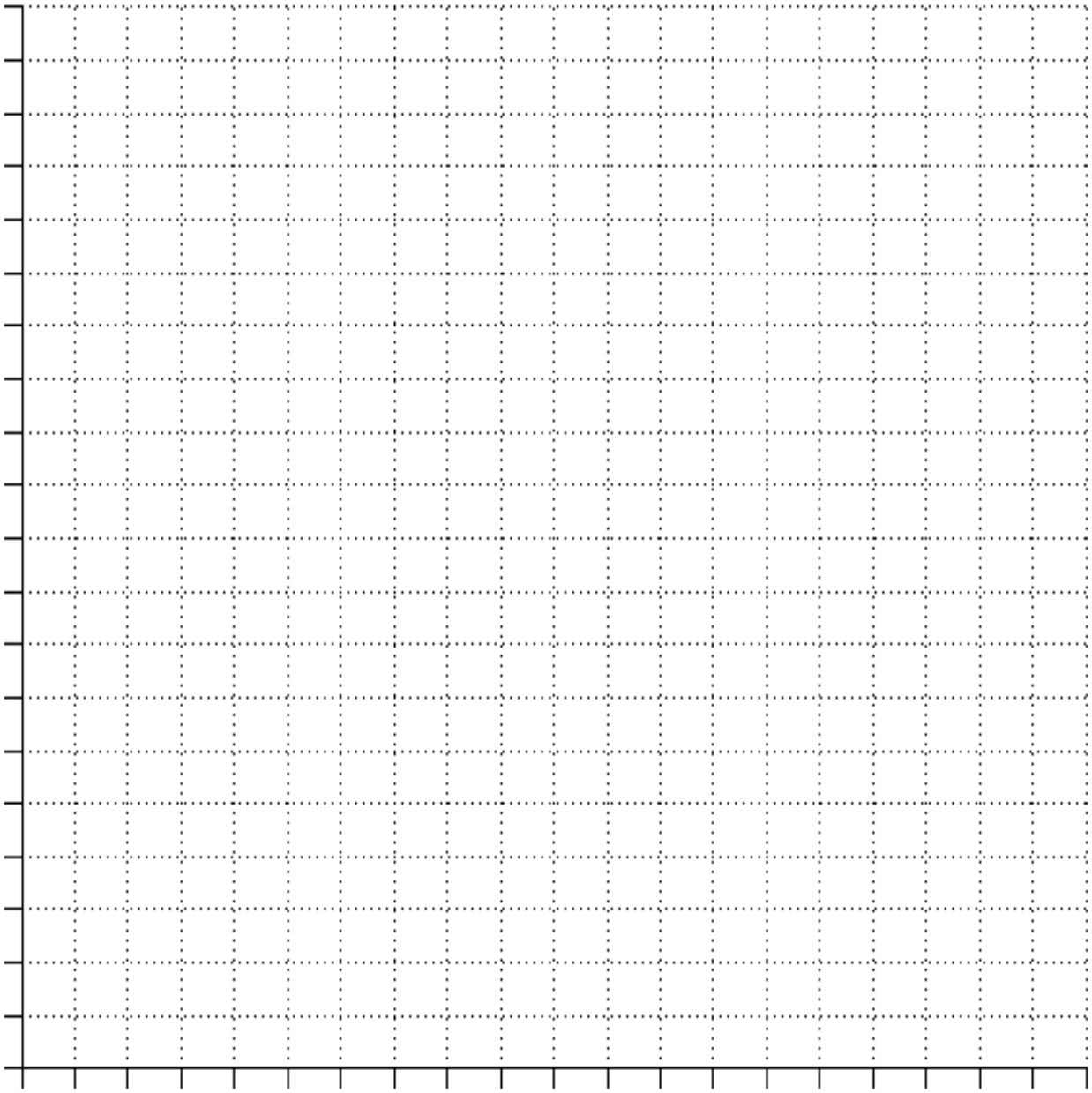
Part 2: Designing Your Own Roller Coaster

Directions: *Now that you identified how the shape of graphs can relate to the motion of an object, like riders on a roller coaster, try designing your own! What types of shapes would you like to include and why? How do those shapes influence the rider's experience?*

Sketch your own blueprint to your roller coaster design using the grid below. Be sure to label the types of materials you will use to create your first model, or a prototype.



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Directions: *Time to design your own roller coaster using linear, horizontal, and vertical lines!! Your coaster must include at least 1 loop.*

Using your design above, label the types of materials you will use to create your first model, or a prototype. Sample materials have been provided below.

1. **DIY physical roller coaster** optional items include:
    - Rulers, Paper rolls, cardboard paper, cardstock, straws, tape, scissors, pool noodles, marble (ball of any sort), and anything else you have in your house. Be creative!

2. **Use video games or simulators** to build your roller coaster, which include:
    - Minecraft or Roblox.

Remember to take pictures, screenshots, or videos and upload to Facebook or email MEGA Math at thsthem@uh.edu!

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Part 3: Post-Building Reflection

Directions: *Read each of the following questions to reflect your build. We want to hear about what you learned. Be prepared to share these reflections!*

1. How did your roller coaster design turn out compared to your design? How many different shapes did your roller coaster track have and why?

_____

_____

_____

2. What made your roller coaster successful?

_____

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3. What issues, if any, did you come across while making the roller coaster? How would you address this in a second build?

_____

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4. How did the shape of the roller coaster affect the speed of your cart (or moving object)? Why do you think this was the case?

_____

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-End-