Student Guide

Achieving Classroom Excellence Act **(ACE)**
End of Course Project
Geometry
Category B
Isn't It Amusing?

Project Overview
Design a fictional amusement park. Create a schematic or build a model of the park using an appropriate scale. Use geometric properties to analyze the park.

Guidelines

The student meets with the Project Coordinator to review progress at the indicated check points in this guide. The student must verify that he/she completed all of ACE End of Course Project without assistance. The student is to submit a completed project with all necessary components and forms to the Project Coordinator who will forward it to the evaluation team.

Directions

- ☐ With your Project Coordinator, determine a timeline for completing the project.
  Project due date:_____
- ☐ Enter target dates for completing each of the CHECKPOINTS in the space provided.
- ☐ Check in with your Project Coordinator at the CHECKPOINTS listed in the project.
- ☐ Complete the project steps.
- ☐ Submit the project, for scoring by the due date.

Requirements for Submission of the ACE End of Course Project

For submission, a completed ACE End of Course Project must include:

- ☐ Completed Student Planner and Agreement
- ☐ A description of the results or the product requested in each step of the project (13 total, see rubric for guidance)
- ☐ Student Learning Reflection
- ☐ Completed Project Submission Form as required for authenticity of the work

Isn't It Amusing?

Project Overview
Design a fictional amusement park. Create a schematic or build a model of the park using an appropriate scale. Use geometric properties to analyze the park.

Task Specifications
You will design a fictional amusement park. Following the Project Steps listed below, you will create a schematic or build a model of the park with all required components. You may build your model or create your schematic using any materials or resources you believe are appropriate as long as you do all of the work yourself. Creativity is encouraged; however, you will not be rewarded for elaborate models or schematics that are not mathematically accurate. In addition, you will answer questions about the design of your park and analyze the geometric properties of your park.

Project Representation
Representation of work may come in a variety of forms, including multi-media presentations, constructed objects, artistic expression, written documents, and verbal expression. Creativity is encouraged!

Project Steps

1. Determine if you will use the metric system (meters) or the standard system of measurement (inches or feet). Explain your selection.

2. At its widest points, the amusement park (not including the parking lot) measures 0.25 miles (400 meters) across and 0.4 miles (650 meters) long. Determine the general shape of your fictional amusement park. Determine the scale that would be most appropriate for you to use when drawing a schematic or building a model of your amusement park. Justify your conclusions.

3. Using your scale from Step 2, develop a schematic or construct a model of a fictional amusement park. The park must meet the following requirements:
   - ☐ It must have a children's playground area.
   - ☐ It must have a 70' (21 m) free-fall tower ride.
   - ☐ It must have a ticket booth with at least four walls, each 4' wide.
   - ☐ It must have a restaurant.
   - ☐ It must have a restroom facility.
   - ☐ It must have a garden.
   - ☐ It will have a parking lot, but the specifications for the parking lot will not be determined until later. The parking lot will be added to your model or schematic at that time.

CHECKPOINT DATE _____ Student Initials___ Coordinator Initials ___

Model Measurements	Length	Width	Height
Amusement park			
Children's playground area			
Free-fall tower ride			
Ticket booth			
Restaurant			
Restroom facility			
Garden			
Parking Lot			

4. Describe the tools and processes you used to ensure that the measurements in your schematic or model are accurate and reasonable.

5. Use geometric properties to prove that your two parallel components (such as a floor and a ceiling of your ticket booth) are actually parallel.

CHECKPOINT DATE _____ Student Initials___ Coordinator Initials ___

6. The parking lot must be built according to civil requirements. These requirements state that amusement parks must have one parking space for every 350 square feet of recreational area. Determine how many parking spaces will be needed.

7. Some of the parking spaces within your parking lot will need to be handicapped accessible.
   - Use the table below to determine how many of your parking spaces need to be reserved for accessible parking spaces.

Total Spaces in Lot	Accessible Spaces Required
1-25	1
26-50	2
51 - 75	3
76-100	4
101-150	5
151-200	6
201-300	7
301-400	8
401-500	9
501-1000	2% of total spaces*
1001 and over	20 + (1 per 100 over 1000)*

   - Using a regular sized parking space, a handicap accessible parking space, and a driving lane from a real parking lot as guides, determine the total area of your fictional parking lot. Explain your answer.

Real World Measurements	Length	Width
Regular sized parking space		
Handicap accessible parking space		
Driving lane		

   - Add your parking lot dimensions to step 3. Add your parking lot with all labeled components to your schematic or model.

CHECKPOINT DATE _____ Student Initials___ Coordinator Initials ___

8. You are standing 15 feet (4.5 meters) from the free-fall tower ride when you notice your best friend is at the very top of the ride. On a coordinate grid, diagram the angle of eyesight from you to your friend. Label the key coordinates in your diagram.

9. Calculate the distance from you to your friend. Explain your calculation using the Pythagorean Theorem.

10. Use trigonometric ratios to determine the angle of eyesight from you to your friend.

CHECKPOINT DATE _____ Student Initials___ Coordinator Initials ___

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11. In order to make room for an outdoor amphitheater that will attract concert audiences, you need to relocate your favorite ride within your amusement park with as little disruption as possible. Determine the new coordinates for your favorite ride. Explain why you chose the new location for that ride and any other considerations that had to be made for the relocation.

12. Identify the type of transformation that could be used on the vertices of your ride to move it from its original location to its new location.

13. One of your managers said, "If people are eating snow cones, then it is hot." Evaluate whether this statement is sometimes true, always true, or never true. Then list and identify the converse, inverse, and contrapositive of this statement.

CHECKPOINT DATE _____ Student Initials___ Coordinator Initials ___

Student Learning Reflection

Using a method of your choice, in the presence of your Project Coordinator explain how this project has contributed to your learning and ability to apply Geometry skills to the real world. (You may choose to write your reflection as if you were writing in a journal, or you may prefer to present your reflection verbally, through a multi-media presentation, or through some other format.) Use the questions below to guide your reflection. You may also reflect on additional topics not listed in the questions.

- What did you learn about data collection methods?
- If you were to repeat this project, what would you have done differently? Why?
- What additional resources would have been helpful in completing this project?

CHECKPOINT DATE _____ Student Initials___ Coordinator Initials ___

Isn't It Amusing? Project Scoring Rubric

PROJECT STEP	STANDARD COMPONENT	SCORING CRITERIA
1. Determine if you will use the metric system or the standard system of measurement. Defend your selection.	Process Standards	0 – No justification or inappropriate reason. 1 – Gave a valid reason to support his/her choice.
2. At its widest points, the amusement park (not including the parking lot) measures 0.25 miles (400 meters) across and 0.4 miles (650 meters) long. Determine the general shape of your fictional amusement park. Determine the scale that would be most appropriate for you to use when drawing a schematic or building a model of your amusement park. Justify your conclusions.	Process Standards	0 – No scale or explanation given. 1 – Determined a shape and an appropriate scale, but little or no explanation provided. 2 – Determined a shape and an appropriate scale with a mathematical explanation provided.
3. Using your scale from Step 2, develop a schematic or construct a model of a fictional amusement park. The park must meet the following requirements: □ It must have a children's playground area. □ It must have a 70' (21 m) free-fall tower ride. □ It must have a ticket booth with at least four walls, each 4' wide. □ It must have a restaurant. □ It must have a restroom facility. □ It must have a garden. □ It will have a parking lot, but the specifications for the parking lot will not be determined until later.	Process Standards	0 – Schematic or model is not reasonable for an amusement park. 1 – Schematic or model is reasonable for an amusement park but only includes the minimum requirements. 3 – Schematic or model is reasonable for an amusement park and demonstrates that the student has great creativity or detail in the representation.
	Standard 2 Standard 4	0 – Measurements (lengths and angles) in schematic or model are not accurate based on scale and all other information provided. 1 – Measurements (lengths and angles) in schematic or model are mostly accurate based on scale and all other information provided. 2 – Measurements (lengths and angles) in schematic or model are all accurate based on scale and all other information provided.

4. Describe the tools and processes you used to ensure that the measurements in your schematic or model are accurate and reasonable.	Standard 2	0 – Tools were inappropriate or no explanation provided of tools and/or processes. 1 – Explanation provides evidence that the student can select and use mathematical tools correctly.
5. Use geometric properties to prove that your two parallel components (such as a floor and a ceiling of your ticket booth) are actually parallel.	Standard 1 Standard 2 Standard 3	0 – Did not provide a proof or justification that the surfaces are or are not parallel. 1 – Provides an informal justification that the surfaces are or are not parallel. 2– Provides a formal proof that the surfaces are or are not parallel.
6. The parking lot must be built according to civil requirements. These requirements state that amusement parks must have one parking space for every 350 square feet of recreational area. Determine how many parking spaces will be needed.	Process Standards Standard 2	0 – Did not determine an accurate number of spaces based on area of amusement park created in Step 3. 1 – Accurately determined the number of spaces based on area of amusement park created in Step 3.
7. Some of the parking spaces within your parking lot will need to be handicapped accessible. a. Use the table below to determine how many of your parking spaces need to be reserved for accessible parking spaces. b. Using a regular sized parking space, a handicap accessible parking space, and a driving lane from a real parking lot as guides, determine the total area of your fictional parking lot. Explain	Process Standards	0 – Did not do any unnecessary critical thinking, problem solving, and mathematical reasoning. 2 – Demonstrated critical thinking, problem solving, and mathematical reasoning skills above those required to answer the questions.
	Standard 1 Standard 2	0 – Did not accurately determine the total area of the parking lot. 1 – Accurately determined the total area of the parking lot, but did not explain. 1 – Did not accurately determine the total area of the parking lot, but provided a logical explanation of how to calculate the total area. 2 – Accurately determined the total area of the parking lot and provided a valid explanation.

8. You are standing 15 feet (4.5 meters) from the free-fall tower ride when you notice your best friend is at the very top of the ride. On a coordinate grid, diagram the angle of eyesight from you to your friend. Label the key coordinates in your diagram.	Standard 4 Standard 5	0 – Did not create an accurate diagram on a coordinate grid. 1 – Created an accurate diagram on a coordinate grid.
9. Calculate the distance from you to your friend. Explain your calculation.	Standard 3 Standard 5	0 Did not calculate the distance accurately. 1– Calculated the distance accurately. 1 – Calculated the distance accurately and provided an appropriate explanation.
10. Use trigonometric ratios to determine the angle of eyesight from you to your friend.	Standard 3	0 – Did not calculate the angle correctly or did not provide evidence of using trigonometric ratios. 1– Calculated the angle correctly using trigonometric ratios.
11. Determine the new coordinates for your favorite ride. Explain why you chose the new location for that ride and any other considerations that had to be made for the relocation.	Standard 1 Standard 2 Standard 5	0 – Did not accurately identify new Coordinates. 1 – Accurately identified new coordinates but did not provide an explanation (or explanation is not mathematically appropriate) for the ride's new location. 2– Accurately identified new coordinates and provided a mathematically appropriate explanation.
12. Identify the type of transformation that could be used on the vertices of your ride to move it from its original location to its new location.	Standard 5	0 – Did not identify the Transformation. 1 – Accurately identified the transformation.

13. One of your managers said, "If people are eating snow cones, then it is hot." Evaluate whether this statement is sometimes true, always true, or never true. Then list and identify the converse, inverse, and contrapositive of this statement.	Standard 1	0 – Does not list and identify the conditional statements. 1 – Correctly evaluates the truth of the given statement. 2 – Correctly evaluates the truth of the given statement and lists the conditional statements. 3– Correctly evaluates the truth of the given statement and lists and identifies the conditional statements.
14. Explain how this project has contributed to your learning and ability to apply Algebra I skills to the real world.	Process Standard	0 – No explanation or inappropriate explanation. 1- Explanation provided.