Project Title: *Inclusive Playground Design Challenge*

Objective

Students will design a playground for children with disabilities, incorporating mathematical concepts such as Pythagoras' theorem, linear equations, the area of triangles and circles, and probability.

Scenario Description

The town council has allocated a plot of land measuring 60m x 40m for an inclusive playground. Your task is to design a functional, safe, and fun playground that meets accessibility standards while incorporating creative features.

Project Guidelines

1. Key Features to Design

1. **Ramp for Wheelchair Accessibility:**
    - Use **Pythagoras' theorem** to calculate the length of a wheelchair ramp.
    - The ramp must have a slope ratio of 1:12, with a rise of no more than 1.5m.
    - Task: Determine the ramp's length and verify its suitability.
2. **Playground Equipment Layout:**
    - Include at least one circular feature (e.g., a merry-go-round or sandpit).
    - Calculate the **area of the circle** to ensure it fits within the playground.
    - Example Task: "Design a merry-go-round with a radius of 3m. Calculate its area and perimeter to ensure it fits in your layout."
3. **Triangular Play Zone:**
    - Create a climbing structure or another feature in the shape of a triangle.
    - Calculate the **area of the triangle** and justify its inclusion in your design.
    - Example Task: "Design a triangular climbing frame with a base of 5m and height of 4m. Determine the area to ensure it fits within your layout."

4. **Pathways:**
    - Design connecting pathways between features using **linear equations** to represent their lengths and costs.
    - Example Task: "Create a straight path modeled by the equation y=2x+5y = 2x + 5y=2x+5. Calculate its length and determine the cost if paving costs $10 per meter."

5. **Probability Component**

- Survey peers to determine which playground features are most popular. Use this data to assign probabilities to different activities being chosen during a typical visit.
- Example Task: "If the probabilities of children using the swing, ramp, or merry-go-round are 0.4, 0.3, and 0.3 respectively, determine the probability of two children randomly selecting the same feature."

Deliverables

1. **Design Plan:**
    - A detailed scale drawing of the playground, including all features and dimensions.
2. **Mathematical Calculations:**
    - Show all work for Pythagoras' theorem, area calculations, linear equations, and probability analysis.
3. **Reflection:**
    - Write a short explanation of how your design supports inclusivity and accessibility.

Assessment Criteria

Criterion	Description	Weight
Accuracy	Correct use of mathematical concepts and calculations.	40%
Design Creativity	Innovative playground layout with accessibility features.	30%
Application of Probability	Effective use of probability to support design decisions.	10%
Presentation	Clear and detailed diagrams and explanations.	20%

Worksheet 1: Planning the Playground **Name: _____**

1. **Plot Size:**
    - Your playground is on a **60m x 40m plot**. Sketch the plot below.
2. **Key Features (Brainstorm):**
    - List at least 5 features your playground will include. (e.g., ramp, merry-go-round, climbing area, sandbox, swings).
    - Which of these features specifically address accessibility for children with disabilities?

Worksheet 2: Using Pythagoras' Theorem

Task: Design a wheelchair ramp with a rise of **1.2m**.

1. What is the minimum ramp length needed if the slope ratio is 1:12?
2. Label the dimensions on a sketch of your ramp.

Worksheet 3: Calculating Areas of Shapes

Task 1: Circle

1. One feature (e.g., merry-go-round) has a **radius of 3m**.
    - Calculate the area
2. Show your work:

Task 2: Triangle

1. Design a triangular play area with a **base of 6m** and a **height of 4m**.
    - Calculate the area
2. Sketch your triangle and label its dimensions.

Worksheet 4: Pathways with Linear Equations

Task: Design pathways connecting the features.

1. Write a linear equation to represent one pathway (e.g., y=2x+5y = 2x + 5y=2x+5).
2. Calculate the length of the pathway over the given domain 0≤x≤100 \leq x \leq 100≤x≤10.
3. Cost Analysis: If paving costs **$10 per meter**, calculate the total cost of this pathway.

Worksheet 5: Probability Analysis

Survey Questions:
Ask at least 10 people: *What is your favorite playground feature?* (Provide a list of 5 features.)

1. **Data Table:**

Feature	Number of Votes	Probability (out of total votes)
Swings		
Ramp		
Merry-Go-Round		
Sandbox		
Climbing Area		

2. **Probability Calculations:**
    - What is the probability of a child choosing the ramp?
    - If two children are randomly choosing features, what is the probability they choose the same feature?

Final Submission Checklist

1. **Scale Drawing:** Include all features with labeled dimensions.
2. **Mathematical Calculations:** Show all your work.
3. **Reflection:** Write 1-2 paragraphs about how your playground design supports inclusivity.