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Otto the Geometer: Measuring with Robot Steps

Main Theme

Calculating the perimeter and area of geometric figures by programming the HP Otto robot to move accordingly.

Objectives and Tasks

Learning Objectives

1. - Identify and calculate the perimeter of regular geometric figures through Otto's programmed movements.
2. - Understand and apply area formulas for rectangles, squares, and triangles by converting robot steps into metric units.
3. - Introduce basic principles of sequential programming and computational thinking.
4. - Relate measurements to real-life situations, reinforcing spatial orientation and mathematical logic.

Learning Tasks

1. - Program Otto's movements to simulate walking around geometric shapes on the floor.
2. - Count and convert Otto's steps into centimeters or meters.
3. - Calculate the perimeter by summing the distances covered by Otto.
4. - Apply appropriate formulas to calculate the area of the shapes.
5. - Present group results and share the code used.

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Interdisciplinary Connections

Related Subjects

1. Technology: Use of Otto Blockly or Arduino to program movements.
2. - Physical Education: Representation of geometric shapes in real space using body movement.
3. - Art Education: Design and visual representation of figures, including robot decorations.
4. - Language Arts: Oral presentation of the process and group results.

Practical Applications

1. Measuring perimeters and areas of real spaces using non-conventional units.
2. - Development of spatial skills applicable in architecture, engineering, or design.
3. - Application of logical thinking in a tangible context, with support for digital competence.

Required Materials and Resources

Physical Resources

1. - HP Otto robot (one per group)
2. - Masking tape to mark shapes on the floor
3. - Rulers, meter sticks, or measuring tapes

Digital Resources

1. Computers with Internet access
2. - Projector or simulation display capability

Session Structure

Introduction

1. - Explanation of what perimeter and area are, with visual examples.
2. - Presentation of the challenge: program Otto to walk around a shape on the floor and calculate its dimensions.

Development

1. Programming Otto to follow the sides of the shape.
2. - Measure the time it takes Otto to walk 10 cm.
3. - Identify each side and determine the total perimeter.

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4. - Apply formulas to calculate area.
5. - Record and compare results across groups.

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- Sharing calculations and code used.
- Guided reflection: Which shape was easier? What mistakes were corrected?
- Real-life connection: Where could we use this kind of robot-based measurement?

Expected Outcomes

Key Learnings

1. Identifying perimeters and areas through programmed movements.
2. Practical application of math formulas in hands-on activities.
3. Introduction to computational thinking through simple programming.

Final Results

1. Students' calculations and diagrams of geometric figures.
2. Solved practical problems presented during the session.

Notas adicionales

Suggestions

- Encourage teamwork to solve complex challenges.
- Use questioning techniques to reinforce understanding of formulas.

Possible Extensions

- Introduce the concept of volume in 3D figures for advanced students.
- Link areas and perimeters to sports statistics and physical activities.

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