
INITIATE Lesson Plan: Driving Around Campus

Lesson plan at a glance...

Name: Driving Around Campus

Course: Math 4

Grade Level: 12

Prerequisites: Perimeter, characteristics of polygons

Time: 2-3 class periods

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Lesson Overview

In this lesson, students will find missing lengths of irregular polygons, then program the smart car to create the path.

Driving Questions

Overarching Driving Questions for Bowsher Wide Project:

- How can we make smart cars safer and more convenient?
- How can we protect them from cyberattacks?

Lesson Specific Question: What is the best path for the UT shuttle to take students around campus?

Materials and Equipment

Worksheet, smart cars, tablets (or Chromebooks), graph paper, pencil, large graph paper for smart cars, UT map

Preparation Tasks

	Set up graph paper on the floor, smart cars and tablets/Chromebooks; distribute worksheets	5 minutes
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The Lesson

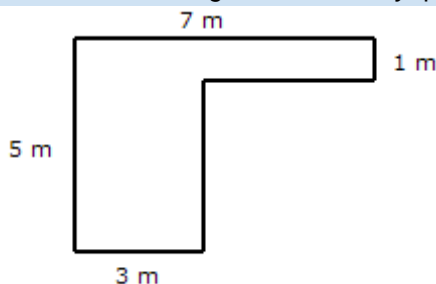
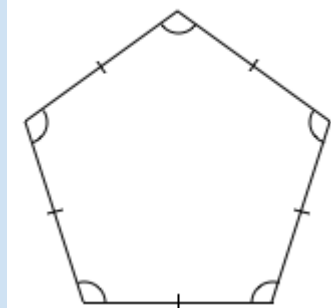
Warm-up Activity: Discuss perimeter of regular and irregular figures	5 minutes
Activity 1: Worksheet: given an irregular polygon, find the missing side lengths, then determine perimeter. (<i>Thinking Mathematically</i> textbook, p. 530)	15 minutes
Activity 2: Program smart car to travel paths similar to problems from WS.	20 minutes
Activity 3: Given map of UT, program smart car to travel a path around campus.	30 minutes
Wrap-up Activity: Compare each group's ideas about a best path to travel around UT.	20 minutes

Warm-up Activity: Perimeter of regular and irregular polygons (5 minutes)

Activity Overview: In this activity, students will find perimeter of one regular and one irregular polygon shown on the board.

Activity: Find the perimeter of each figure. See *Thinking Mathematically*, p. 530, #24

A REGULAR POLYGON



Activity 1: Perimeter Worksheet (15 minutes)

Activity Overview: In this activity, students will determine missing side lengths and find the perimeter of irregular figures.

Activity: With a partner, find missing sides using congruent parallel sides. Then add all sides to find perimeter.

Teaching Tips:

- Be sure students are finding missing sides first, then adding every side and writing correct units.

Activity 2: Travel the Path (20 minutes)

Activity Overview: In this activity, students will work with a partner to use Bloxter on a Chromebook (or Samsung tablet) to create a path like one of the problems on the worksheet.

Activity: Students will work with a partner to use Bloxter on a Chromebook (or Samsung tablet) to create a path like one of the problems on the worksheet. If time allows, students will continue by creating another path, or drawing the same path traveling in the opposite direction. Students will then run the program with the smart car to see the path.

Teaching Tips:

- Be sure students choose appropriate commands in Bloxter.

Activity 3: Traveling Campus (30 minutes)

Activity Overview: Work in groups. Choose a path for an autonomous shuttle to travel to designated locations on campus and program the car to travel the path.

Activity: In this activity, students will work in groups, using a map of UT's main campus to choose a path for an autonomous shuttle to travel to designated locations on campus. After agreeing to the most efficient path, students will program their smart car to accurately and safely travel the path. If students finish early, they can determine the amount of time the shuttle would take to travel to different locations on campus.

Teaching Tips:

- *Groups that finish earlier than others can create an entire loop for the shuttle to cover most of the locations on campus.*

Wrap-up Activity: Analysis and reflection (20 minutes)

Activity Overview: Students will compare each group's ideas about a best path to travel around UT. Students will share their paths and reasons they chose a certain route. They will also discuss how they chose commands on Bloxter to run their program.

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Assessment: Look at students' work to determine that they understand how to find missing sides and perimeters. Observe their programs on Bloxter, and that the smart car moved along the correct path.

Learning Objectives and Standards

Learning Objectives	Standards
Apply geometric methods to solve design problems.	G.GM.3
Define appropriate quantities for the purpose of descriptive modeling.	N.Q.2
Choose a level of accuracy appropriate to limitations on measurements when reporting quantities.	N.Q.3

Additional Information and Resources

Computational Thinking Concepts

Feature	Where does this occur in the lesson?
Decomposition	<i>In the warm-up and activity one, students find the missing pieces by comparing them to the congruent parallel side.</i>
Pattern Recognition	<i>In activities 1 and 2, students use the pattern of adding the pieces of the parallel side to make the same sum. In activity 3, students use the same pattern in programing the smart car in Bloxter.</i>
Abstraction	<i>Throughout the whole lesson, students need to find the sum of the side that is parallel to the side with missing information, and ignore the other numbers in the diagrams.</i>

Algorithmic Thinking	<i>Activity 2 and 3 require similar steps in programing the smart cars.</i>
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Project-based Learning Features

Concept	Where does this occur in the lesson?
Driving Question	<i>What is the best path for the UT shuttle to take students around campus?</i>
Making Sense of Data	<i>In activity 3, students need to decide the best way to travel to a given location, and determine how to use the data in Bloxter.</i>
Collaboration	<i>Throughout the lesson, students work together.</i>
Technology	<i>In activities 2 and 3, students program their model smart car to travel a path.</i>

Administrative Details

Contact info: Sandi Christoff email: sandichristoff@gmail.com

Sources: Bloxter.com
<https://www.utoledo.edu/campus/directions/pdfs/Main-Campus-Map.pdf>

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