Performance Based Learning and Assessment Task

Take a Trip

I. **ASSESSSMENT TASK OVERVIEW & PURPOSE:**
The student will use a fixed perimeter and one side length to determine the third vertex of triangular path.

II. **UNIT AUTHOR:**
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III. **COURSE:**
Geometry

IV. **CONTENT STRAND:**
Geometry

V. **OBJECTIVES:**
Forming triangles

VI. **REFERENCE/RESOURCE MATERIALS:**
Calculators

VII. **PRIMARY ASSESSMENT STRATEGIES:**
The student will be assessed using a scoring rubric. (See Attached)

VIII. **EVALUATION CRITERIA:**
Scoring rubric and benchmark of exemplary work attached

IX. **INSTRUCTIONAL TIME:**
One 90-minute period

Take a Trip

Strand
Geometry

Mathematical Objective(s)
Forming Triangles

Related SOL G.5c The student will, given information concerning the lengths of sides and/or measures of angles in triangles, . . . determine if a triangle exists.

NCTM Standards
- Solve problems involving two- and three-dimensional objects represented with Cartesian coordinates
- Apply and adapt a variety of appropriate strategies to solve problems
- Communicate mathematical thinking coherently and clearly to peers, teachers, and others

Materials/Resources
Calculators (if needed for basic calculations)

Assumption of Prior Knowledge
- Students should know how to form a triangle.

Introduction: Setting Up the Mathematical Task

- Your boss, Paul, is taking a trip on the company's private plane. The company plane can only hold a maximum of 1600 gallons of fuel. He is travelling from an airport near his hometown to Airport B. From Airport B, he has to fly 975 sky miles to Airport C for a business meeting. Once he is done with his meeting at Airport C, the company plane has to return to the original airport near his hometown. There is a problem with Paul trip; because of a fuel shortage the plane will not be able to refuel at Airport C. Therefore, there will only be 570 gallons of fuel left in the plane when it departs from Airport C. Which airport does Paul's trip need to start from to ensure the plane will have enough fuel to safely make the trip? *For this situation, assume .8 gallons of fuel will take the plane approximately 1 sky mile.*

Use the following tables of distances to help you determine Paul's starting point.

Possible Starting Airports	Distance to Airport B	Distance to Airport C
Airport 1	260 sky miles	764 sky miles
Airport 2	320 sky miles	700 sky miles
Airport 3	306 sky miles	710 sky miles
Airport 4	390 sky miles	600 sky miles

| Airport 5 | 400 sky miles | 575 sky miles |
| Airport 6 | 264 sky miles | 712 sky miles |

Student Exploration

Student/Teacher Actions:

- Students will individually analyze and determine how to prove the different scenarios given.
- The teacher should make sure all the students stay on task.
- If any students are struggling, the teacher should ask the students leading questions, such as "What do we need to prove a figure is a triangle?" If the student needs more of a visual, give the student a set of AngLegs and ask the student to try to create a triangle using the AngLegs. If AngLegs are not available, two short pencils and one long pencil should also do the trick.

Monitoring Student Responses

- Students will present their trips at the end of class.

Assessment List and Benchmarks

Assessment List

Element	Point Value	Points Earned	
		Self	Teacher
Mathematical procedures are correct.	2		
Mathematical calculations are correct.	2		
The starting airport for the trip is clearly stated	2		
All work is shown neatly in the proof.	2		

#	Element	0	1	2
1	Mathematical procedures are correct	No correct procedures are used	Only one correct mathematical procedure is used	All correct mathematical procedures are used
2	Mathematical calculations are correct	No mathematical calculations are correct	Only one mathematical calculation is correct	All mathematical calculations are correct
3	The starting airport for the trip is stated	No starting airport is stated	N/A	The starting airport is stated
4	All work is shown neatly in the proof	No work is shown	Work is shown but not legible	All work is shown and is legible

Benchmark

Paul's starting airport is Airport 2. 320 miles + 700 miles > 975 miles, which means that Paul's trip would be in a triangular path. The distance between Airport 2 and Airport C is 700 sky miles which is less than 712.5 miles. I got 712.5 sky miles from using the ratio of .8 gallons of fuel used for 1 sky mile and setting up the proportion $\frac{.8\ gallons}{1\ sky\ mile} = \frac{570\ gallons}{x\ sky\ miles}$.