TASK 1 Get Started on the Culminating Project

Objectives

You will be able to

- Use precision when selecting, identifying, and converting between units and dimensions of measurement.
- Find the area of rectangles with lengths given in mixed units.

How can we use mathematics to design a playground that is both fun and safe?

Evaluation and Feedback

To evaluate your work, you will

- Complete the check for understanding about the area of rectangles.
- Make sure your team has a variety of equipment and features to choose from that fit the criteria.

Task 1: Get Started on the Culminating Project

As a group:

- Understand the requirements for your playground project.
- Select possibilities for your playground equipment and activities.
- Review how to calculate the area of a rectangle.

Vocabulary

- design
- dimension
- floor plan
- one-dimensional (1D)
- ratio
- scale
- system
- three-dimensional (3D)
- two-dimensional (2D)
- unit
- volume

Connect to the Culminating Project

Research playground equipment or features to add to your playground. You must have:

- One playground system
- An individual feature
- An activity

Make sure your choices are fun, safe, and promote fitness.

TASK 1

Get Started on the Culminating Project

LESSON 1

LOOK AHEAD TO THE CULMINATING PROJECT

Playgrounds Culminating Project

Name: _____ Teammates: _____

Your team may present your playground as a website, brochure, book, video, or some other method (check with your teacher). You can use Floorplanner, Tinkercad, or another tool to create models of your playground and structures. Near the end of the unit, you will present you playground to your class.

Make sure that your playground includes:

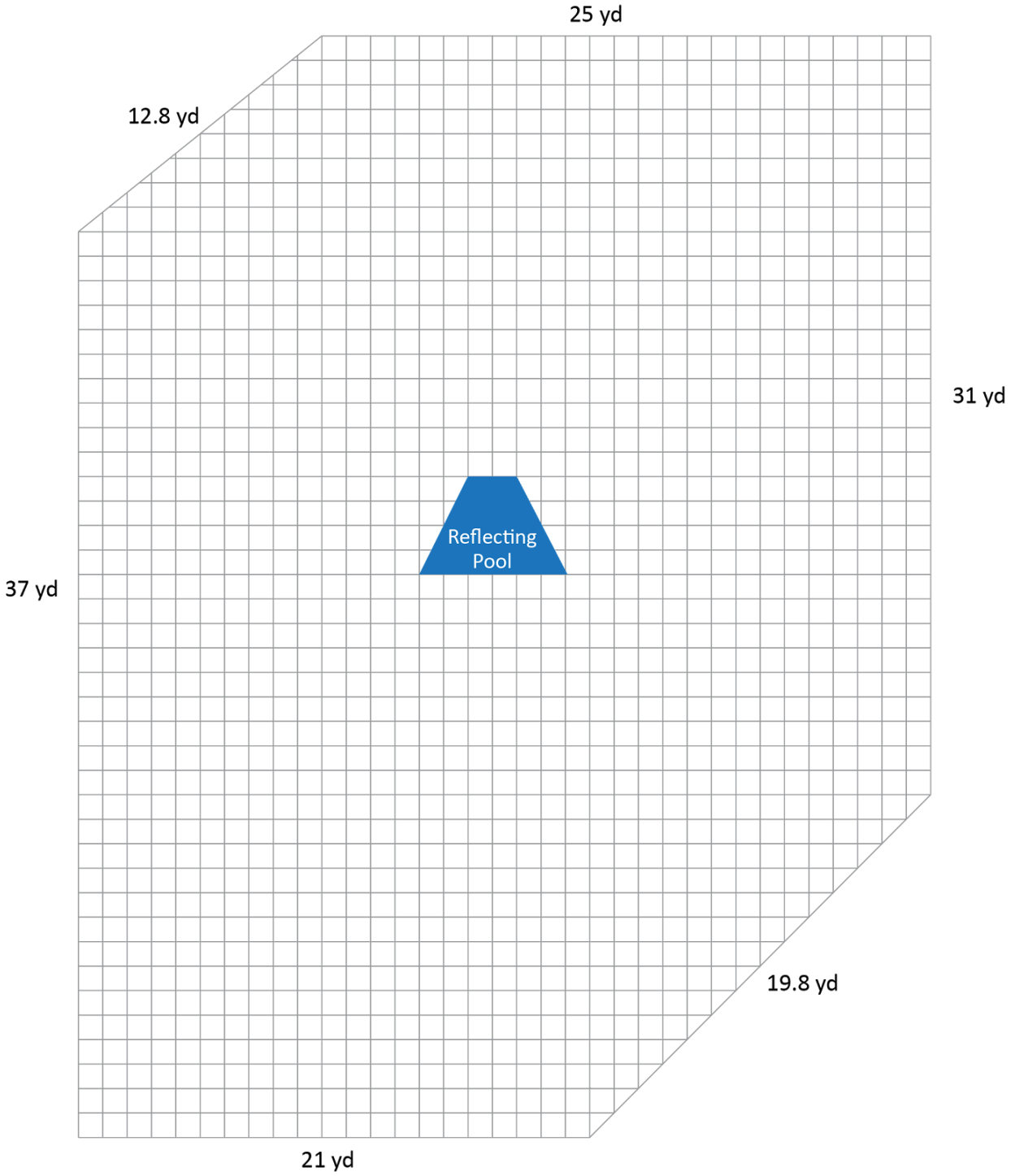
- ❑ A detailed design of your playground that is built to scale (show that there is a consistent ratio connecting distances in your design to distances in real life)
- ❑ Labeling on your design (all equipment, ground cover, use zones, dimensions, units, area, and volumes are labeled)
- ❑ A visual and an explanation about how to fit your systems, features, and activities in your playground floor plan using coordinates in all four quadrants
- ❑ Calculations and an explanation about how to find the area of your entire playground floor plan (name which floor plan you have used)
- ❑ Calculations and an explanation about how to find the area of each of your use zones
- ❑ Calculations and an explanation about the amount of each type of ground cover for your playground (including the extra ground cover needed because you are making a new playground)
- ❑ An explanation of any shortcuts, patterns, or formulas and justifications about why these shortcuts, patterns, or formulas always work
- ❑ A report that uses evidence from your analysis to justify why your playground is fun and safe (thoroughly support all of your claims with evidence)

Rubric

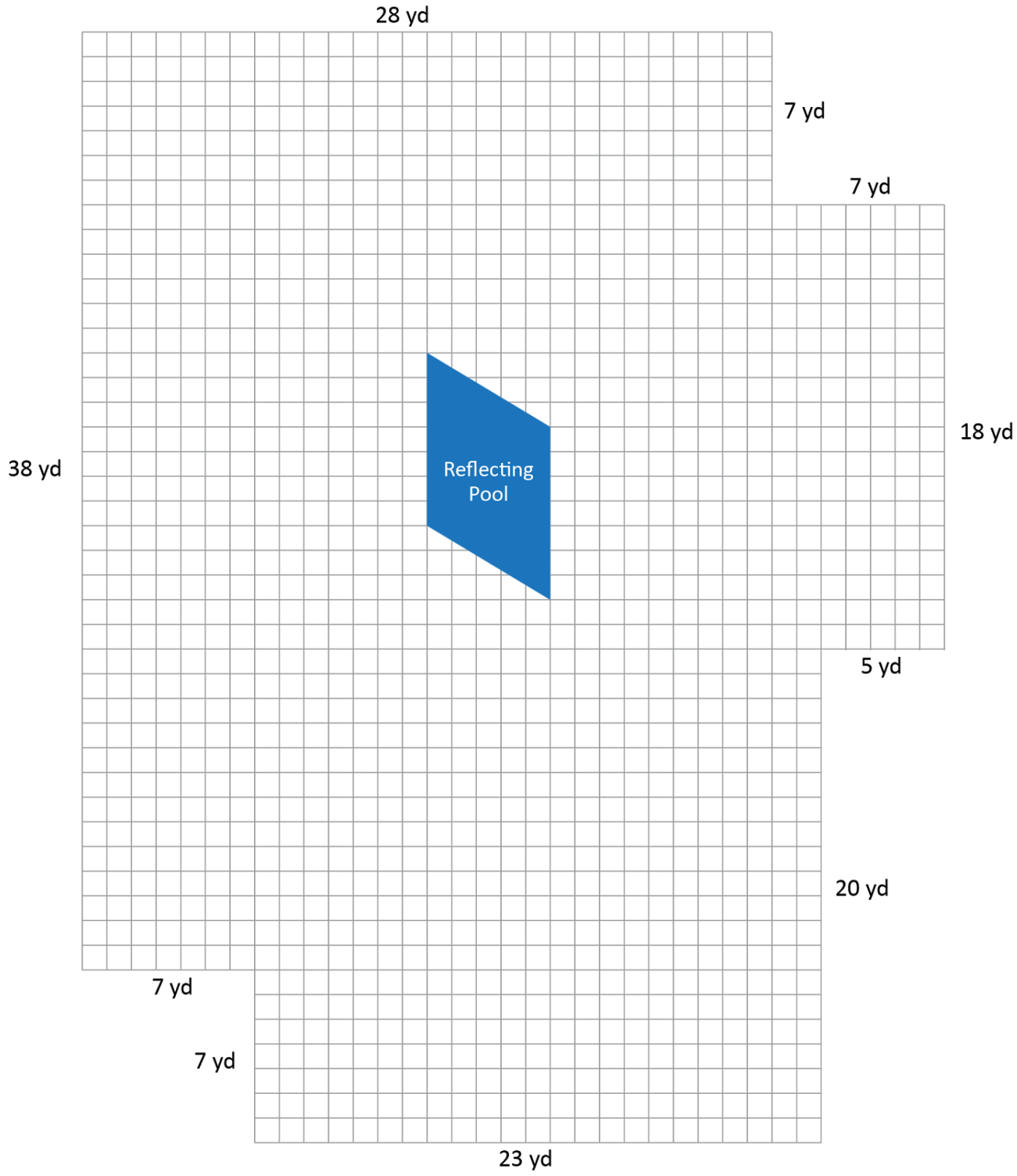
MATHEMATICAL PRACTICE	MASTERS	ACHIEVES	APPROACHES	NOT YET
Model with mathematics (MP4)	Our design is built to scale. We thoroughly show and explain each step of how we found area and volume. We use numbers, words, and other diagrams (tables, pictures, expressions, etc.).	Our design is built to scale. We mostly show and explain each step of how we found area and volume. We use numbers and words.	Our design is built to scale. We partially show and explain each step of how we found area and volume. We only use words or only use numbers.	Our design is not built to scale. We do not show or explain each step of how we found area and volume.
Construct viable arguments (MP3)	Our written report uses evidence from our analysis to justify why our playground is fun and safe. We thoroughly support all of our claims with evidence.	Our written report uses some evidence from our analysis to justify why our playground is fun and safe. We support most claims with evidence.	Our written report uses incomplete or inconsistent evidence from our analysis to justify why our playground is fun and safe. We make claims without support.	We do not make a written report that uses evidence from our analysis.
Look for and make use of structure (MP7)	We clearly show how each area and volume is made of specific dimensions or parts and clearly show how different dimensions or parts can be put together to make different areas and volumes.	We mostly show how each area and volume is made of specific dimensions or parts and clearly show how different dimensions or parts can be put together to make different areas and volumes.	We sometimes show how each area and volume is made of specific dimensions or parts and clearly show how different dimensions or parts can be put together to make different areas and volumes.	We do not show how parts make up the whole.
Look for and express regularity in repeated reasoning (MP8)	We thoroughly show and explain any shortcuts, patterns, or formulas that we used while designing our playground. We justify why these shortcuts, patterns, or formulas work.	We mostly show and explain any shortcuts, patterns, or formulas that we used while designing our playground. We mostly justify why these shortcuts, patterns, or formulas work.	We show and explain some shortcuts, patterns, or formulas that we used while designing our playground.	We do not show or explain any shortcuts, patterns, or formulas in our design.
Attend to precision (MP6)	We make accurate calculations during our analysis. We appropriately label all dimensions and units of measurement.	We mostly make accurate calculations during our analysis. We mostly appropriately label all dimensions and units of measurement.	We have errors in our calculations or we do not use appropriate labels and units of measurement.	We do not use labels and units of measurement.

Playground Floor Plans

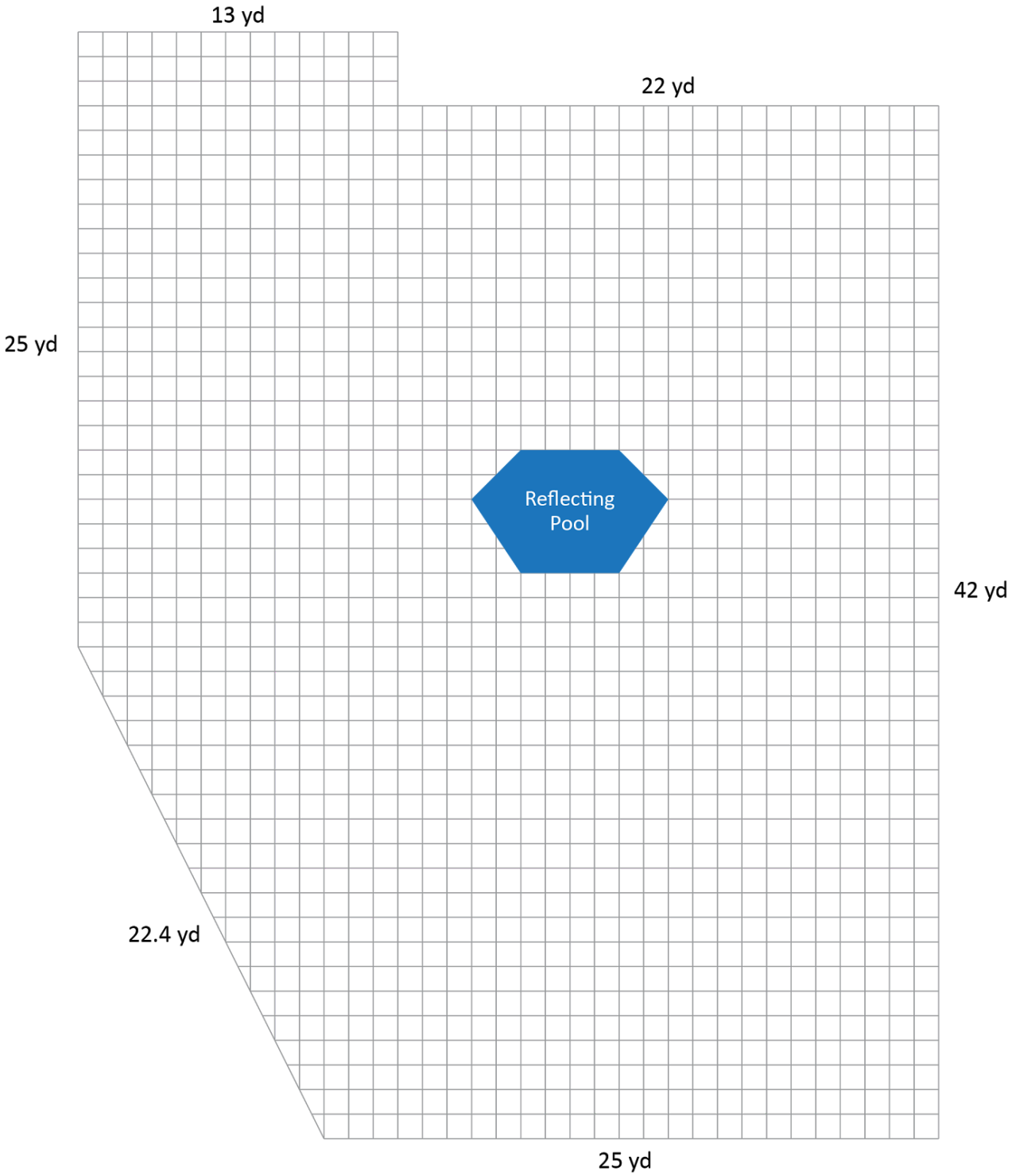
Euclid Playground



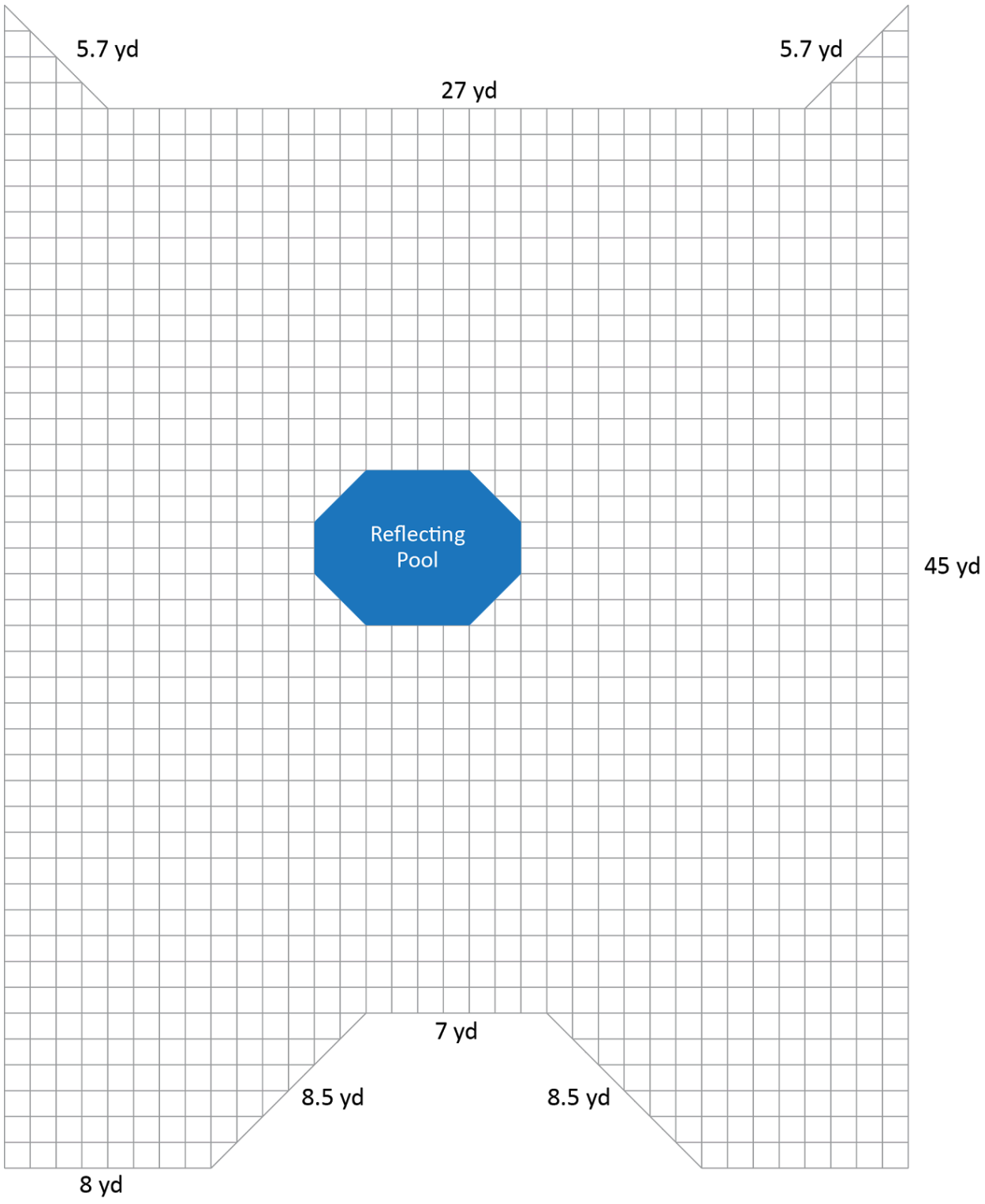
Hypatia Playground



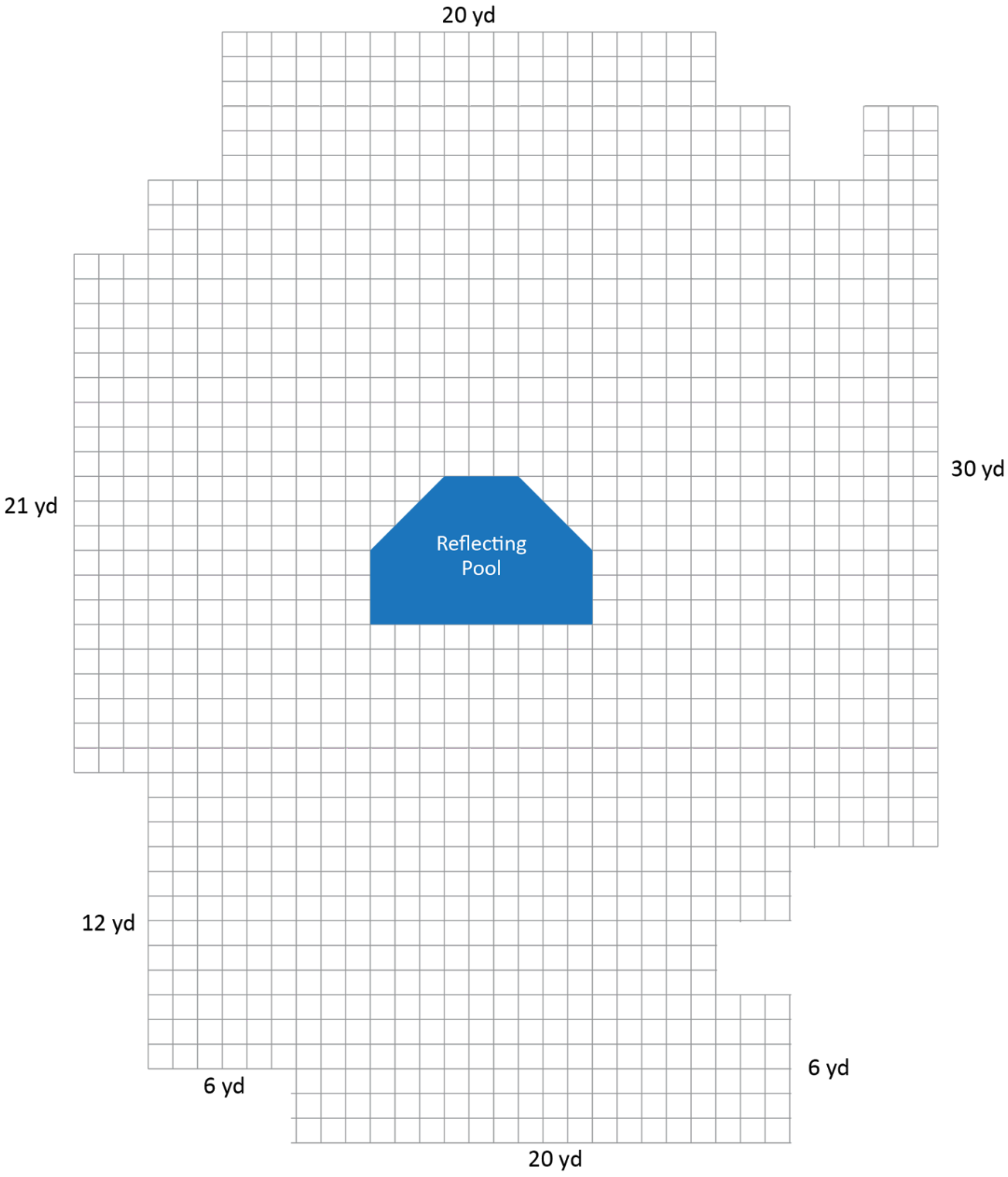
Aristotle Playground



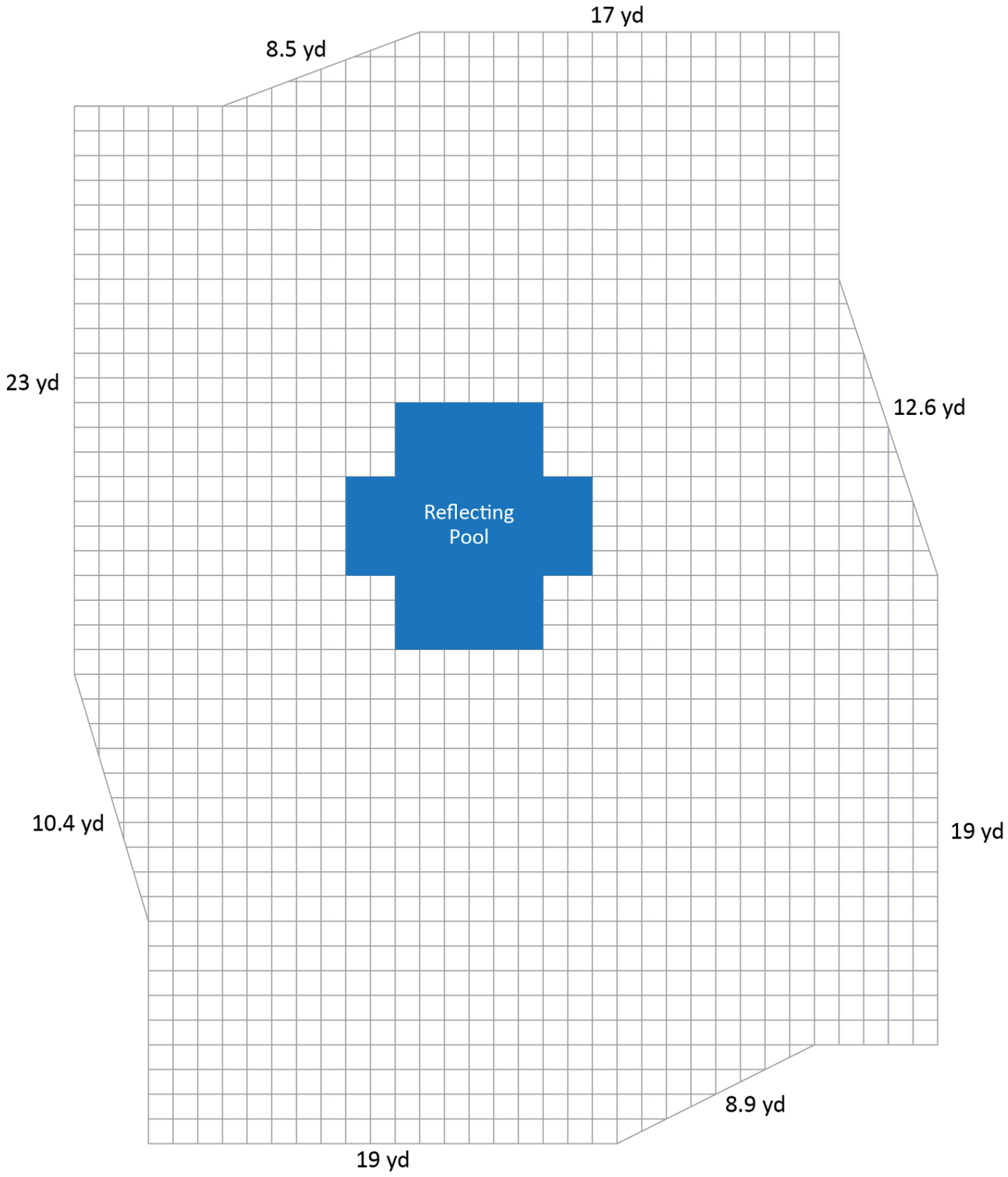
Noether Playground



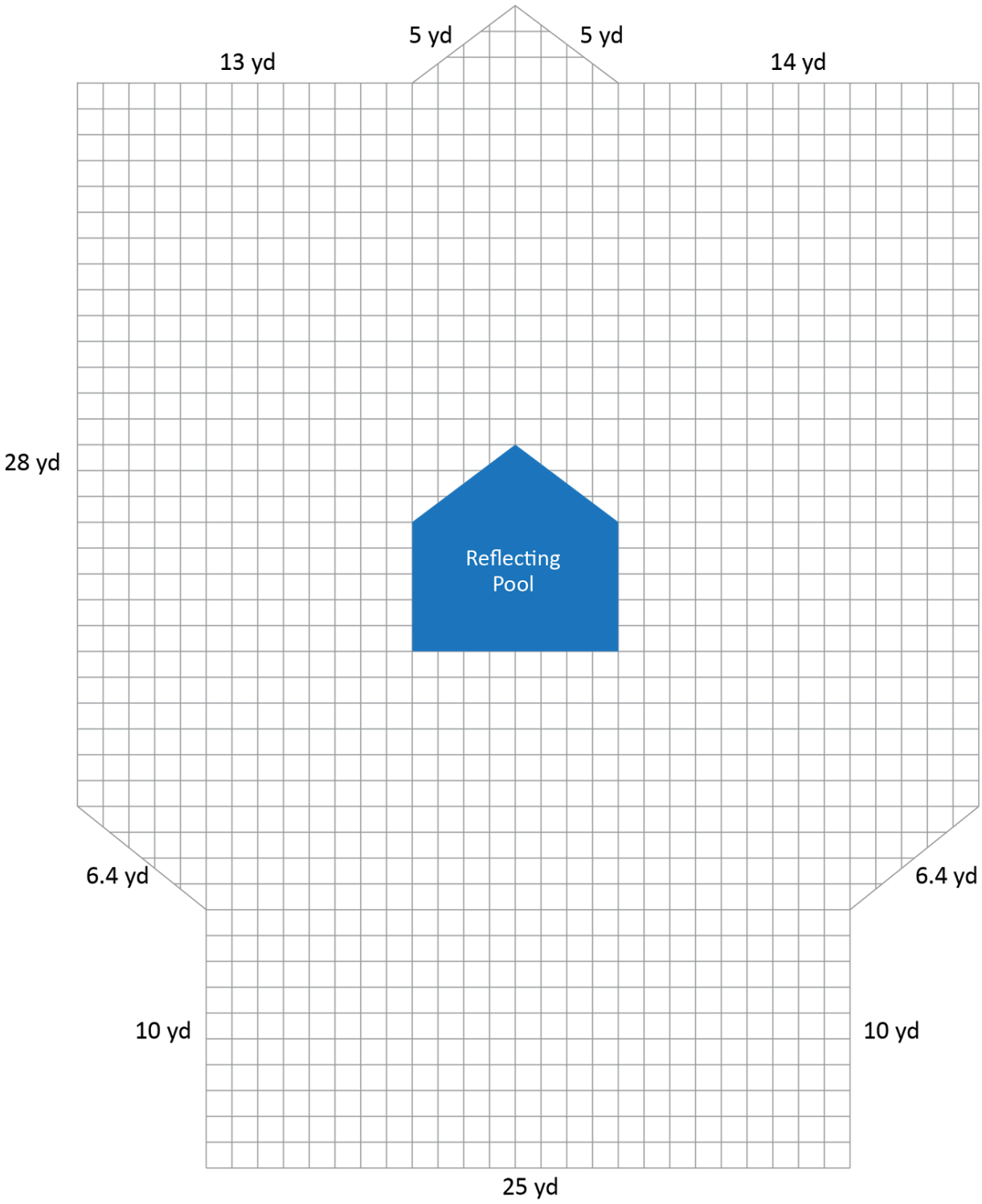
Pythagoras Playground



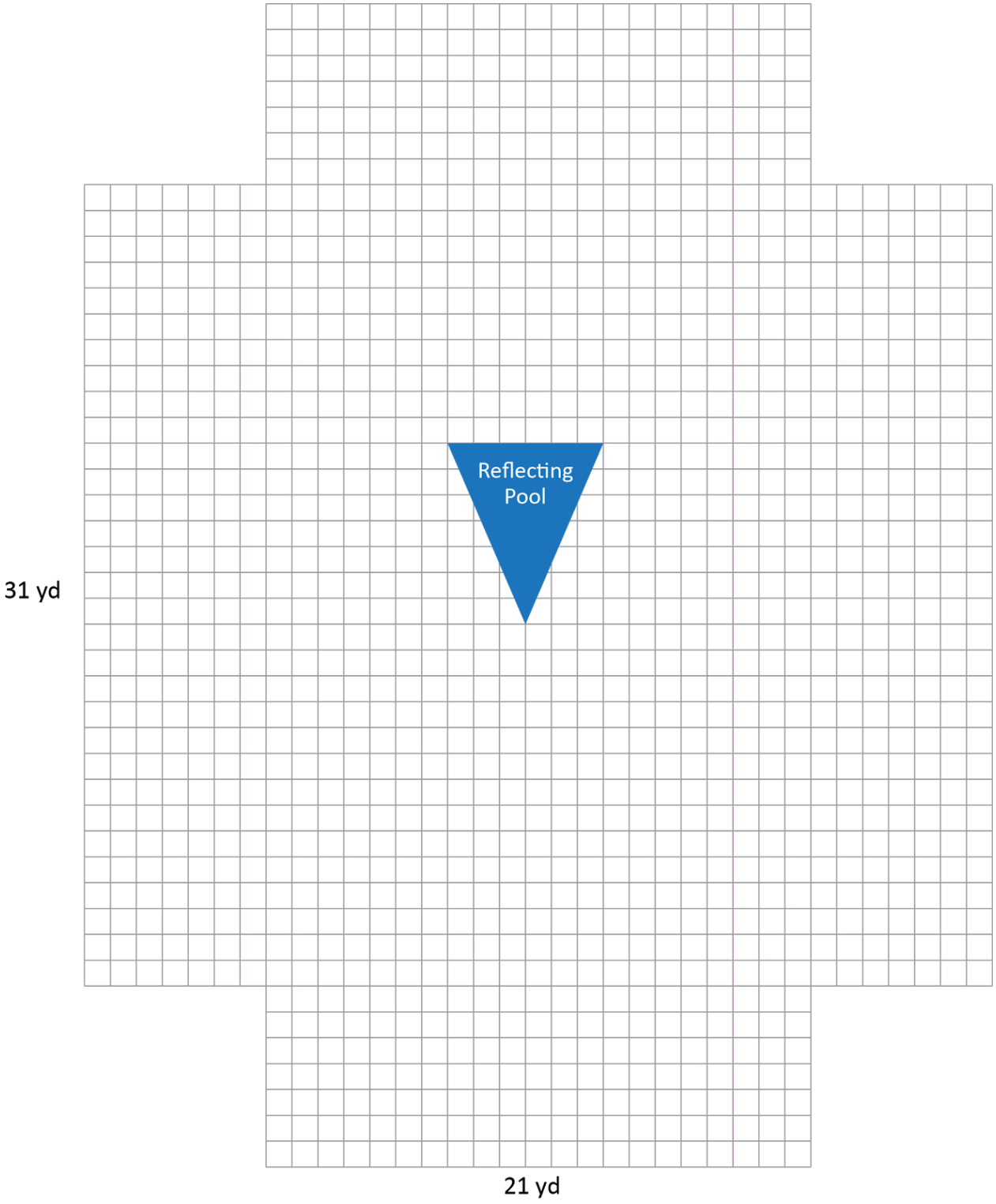
Ramanujan Playground



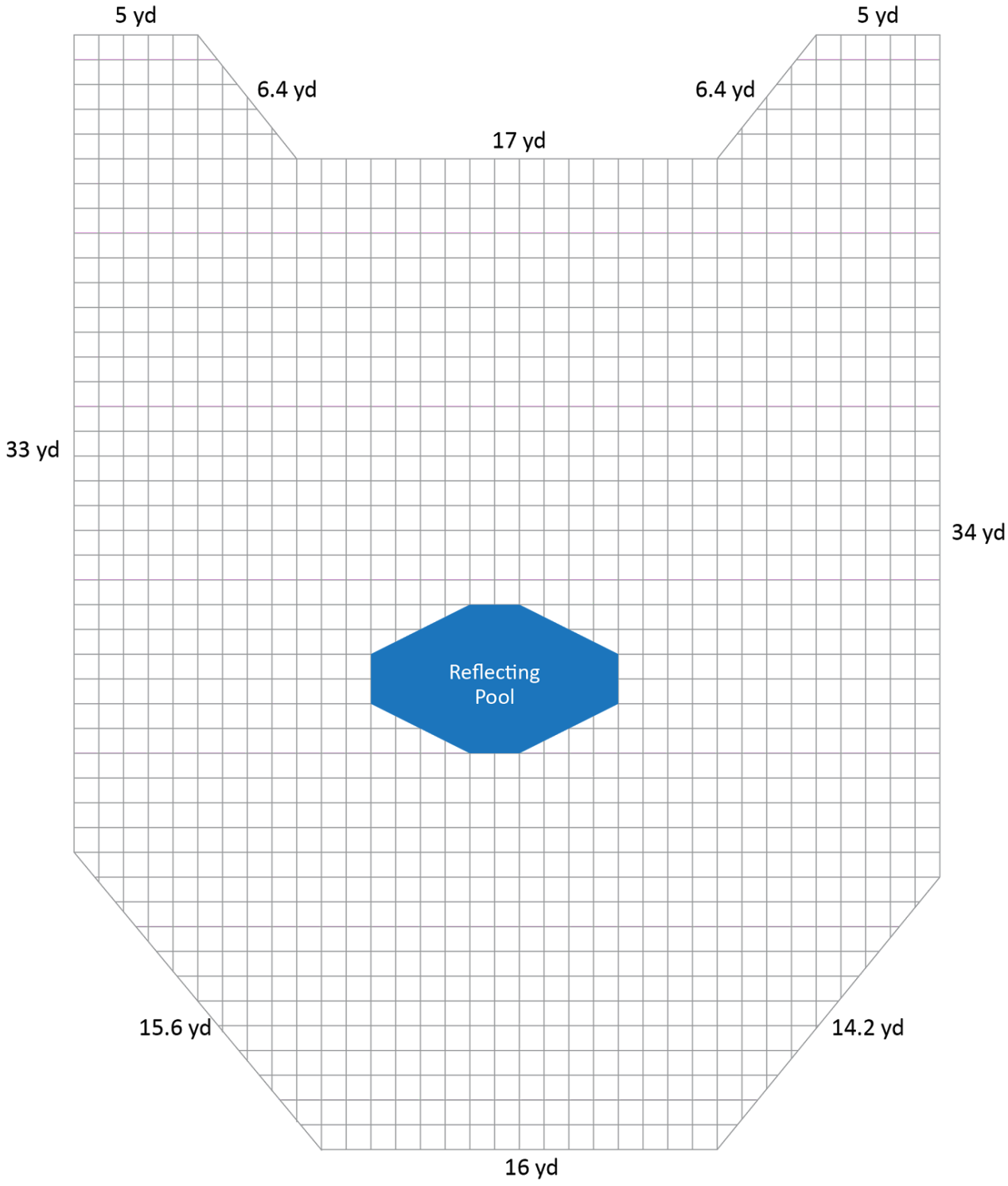
Gauss Playground



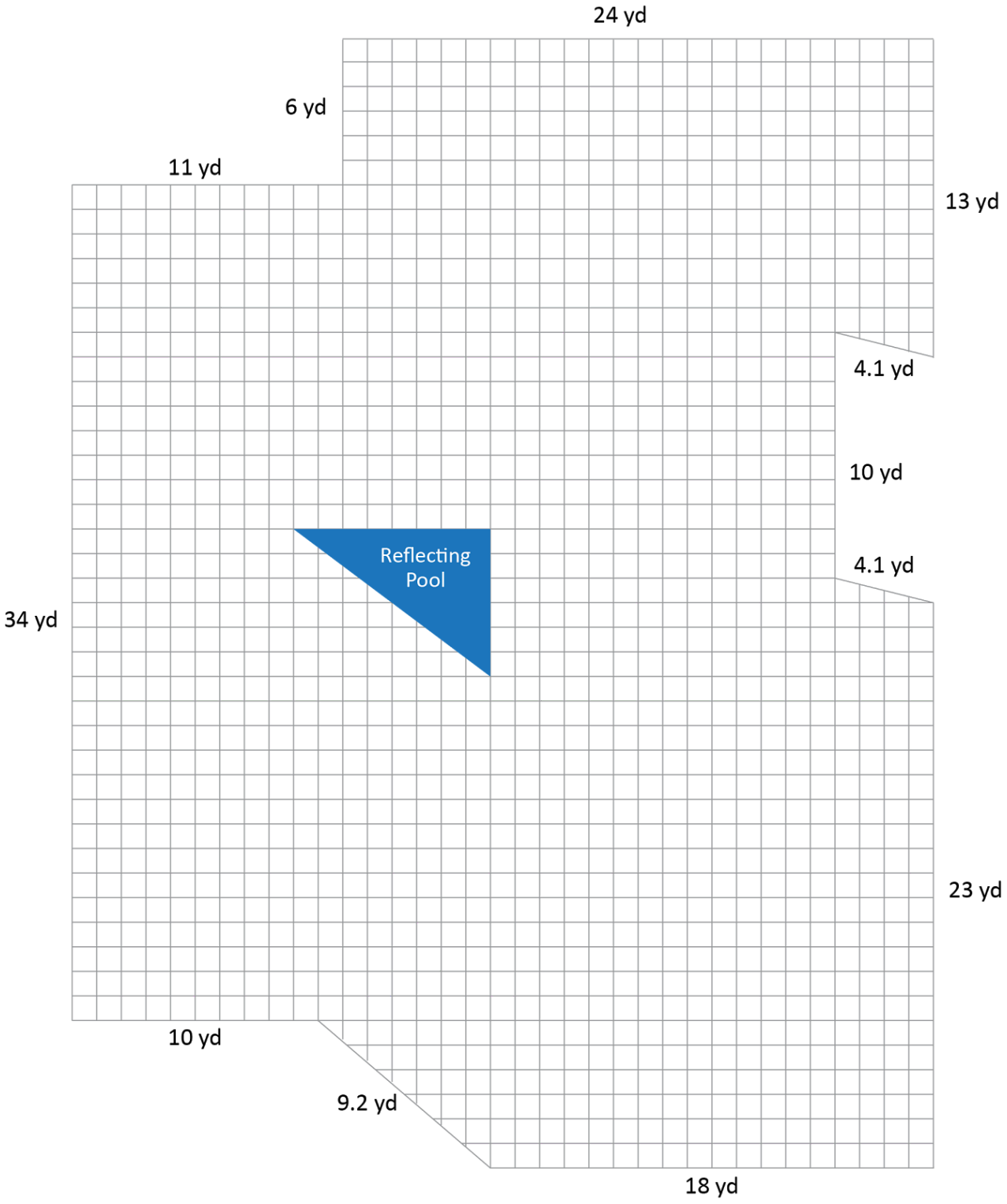
Descartes Playground



Euler Playground



Pascal Playground



Playground Information Table

Complete this table to represent all of the systems, features, and activities included in your ideal playground. **Label all of your units!** You can use the BCI Burke Company website to find information.

Name of Playground Floor Plan

Name and Model Number (Include a Hyperlink)	System, Feature, or Activity	Age Range	Dimensions for Use Zone (in feet)	Area of Use Zone (in square feet)	Fall Height (inches)	Price	Why did your team select this item?

LESSON 2

BUILD BACKGROUND KNOWLEDGE AND SPATIAL REASONING

WARM-UP

Units of Measurement Graphic Organizer

Units of Length (one-dimensional)	Square Units (two-dimensional)	Cubic Units (three-dimensional)
Looks like:	**Looks like:**	**Looks like:**
Examples of units:	**Examples of units:**	**Examples of units:**
Used to measure:	**Used to measure:**	**Used to measure:**

PROJECT ACTIVITY

Information about Swings

Here is some special information about swings.

Swing Set Standards

- Frame height can be 5 feet, 8 feet, or 10 feet.
- There should be no more than two swings located within a single swing bay.
- The distance between swings at rest within a single bay should be at least 24 inches.
- The distance between a swing at rest and its support structure should be at least 30 inches.
- The average swing is 18 inches wide.

Safety Zone (Use Zone) Information

- Safety zones with resilient material are necessary around all playground swings.
- The amount of area required for a safety zone is determined by the height of the swing frame.
- Doubling the frame height of your swings will give you the width required for the safety zone in front of the swing and in back of the swing. For example, if a frame height is 10 feet, the safety zone behind the swing frame is 20 feet and the safety zone in front of the swing frame is 20 feet.
- The length of the safety zone is determined by the number of swing bays.
- Fall height is equal to the frame height.

Swing Frame Height	Base Price for One Swing Bay with Two Swings	Price for Each Add-on Swing Bay with Two Swings
10 feet	$1,115.00	$432
8 feet	$1,046.00	$405
5 feet	$978.00	$310

Continue to work on the Playground Information Table.

CHECK FOR UNDERSTANDING

Test your knowledge of calculating the area of rectangles using the Check for Understanding • Area of Use Zones.