


# HANDOUTS AND ASSESSMENTS

A photograph of a red playground slide and stairs. The slide is a large, curved, red plastic structure. The stairs are made of red metal mesh. The playground is set on a bed of brown wood chips. In the background, there is a grassy field and some trees under a cloudy sky.

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

LEARNING THROUGH PERFORMANCE

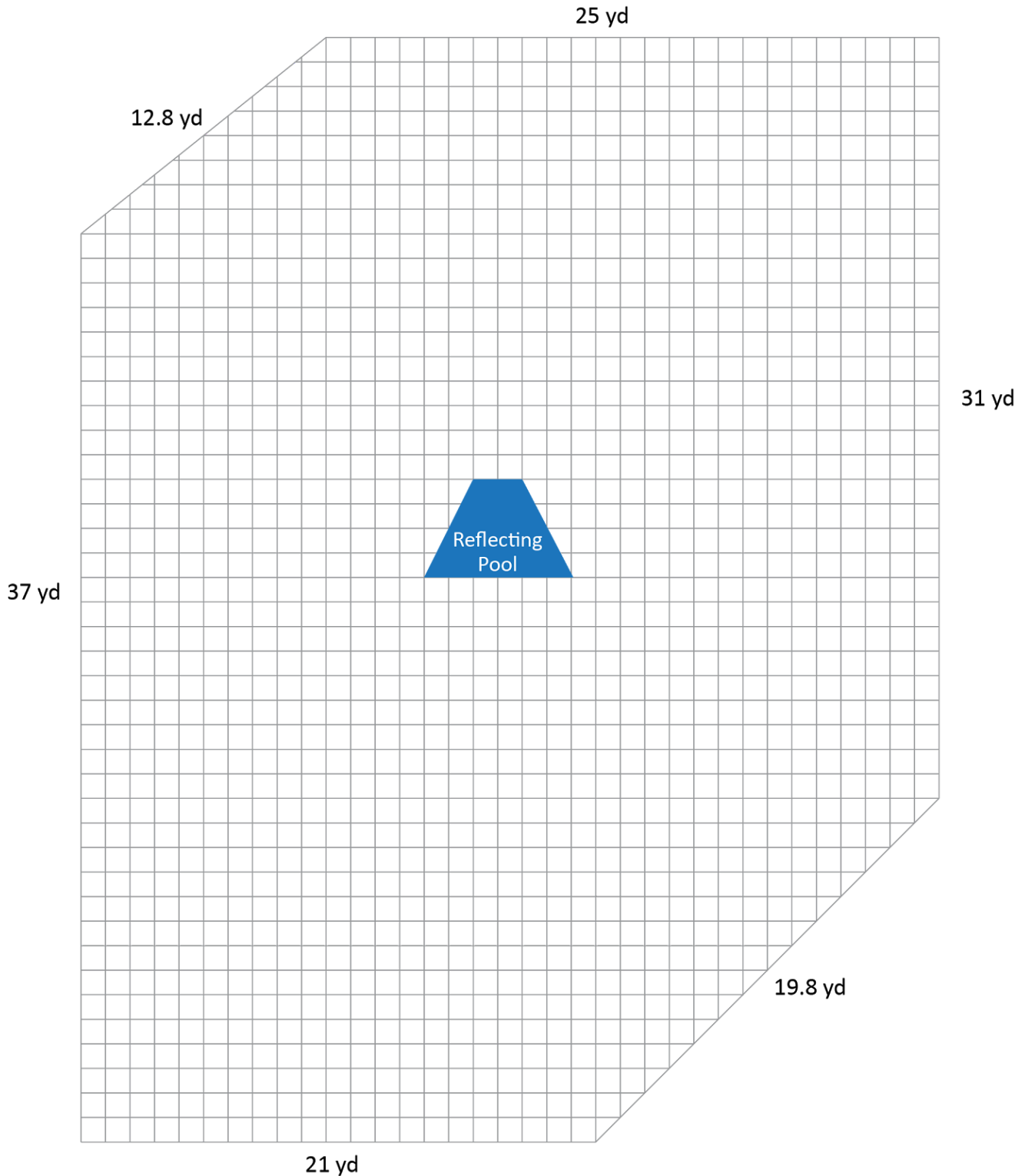
## Playgrounds

GRADE 6

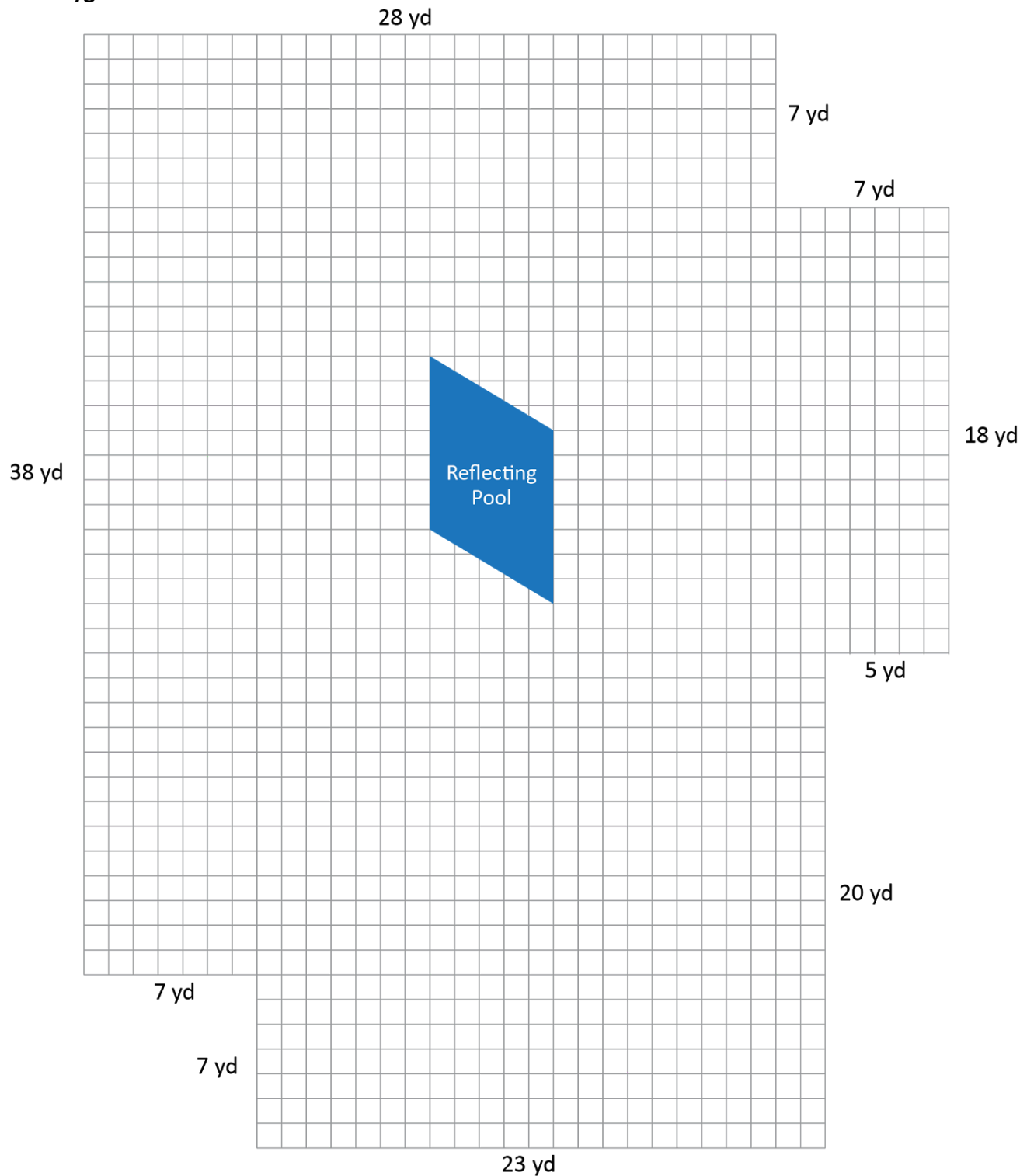


## Get Started on the Culminating Project

### Euclid Playground



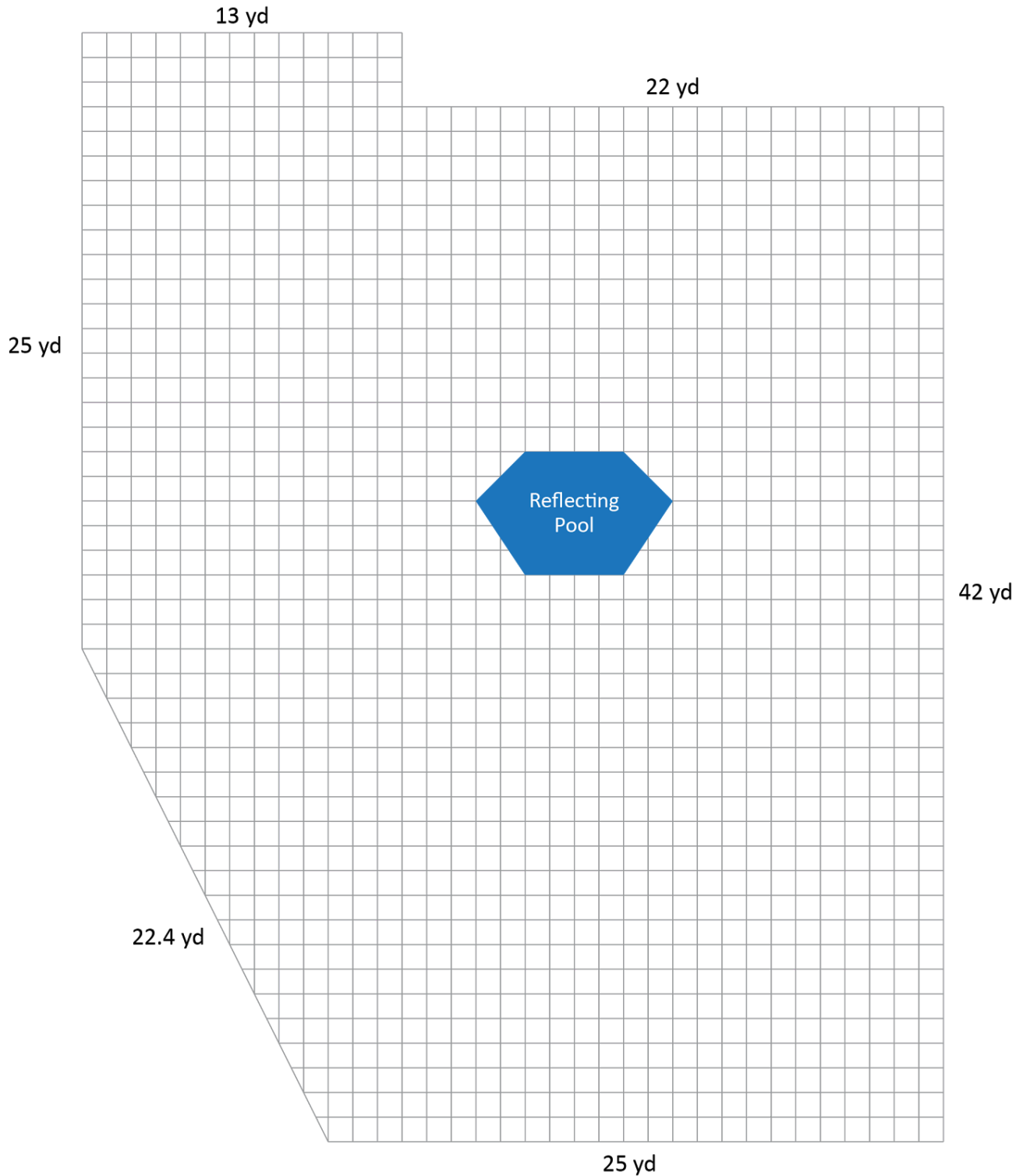
### Hypatia Playground





## Get Started on the Culminating Project

### Aristotle Playground

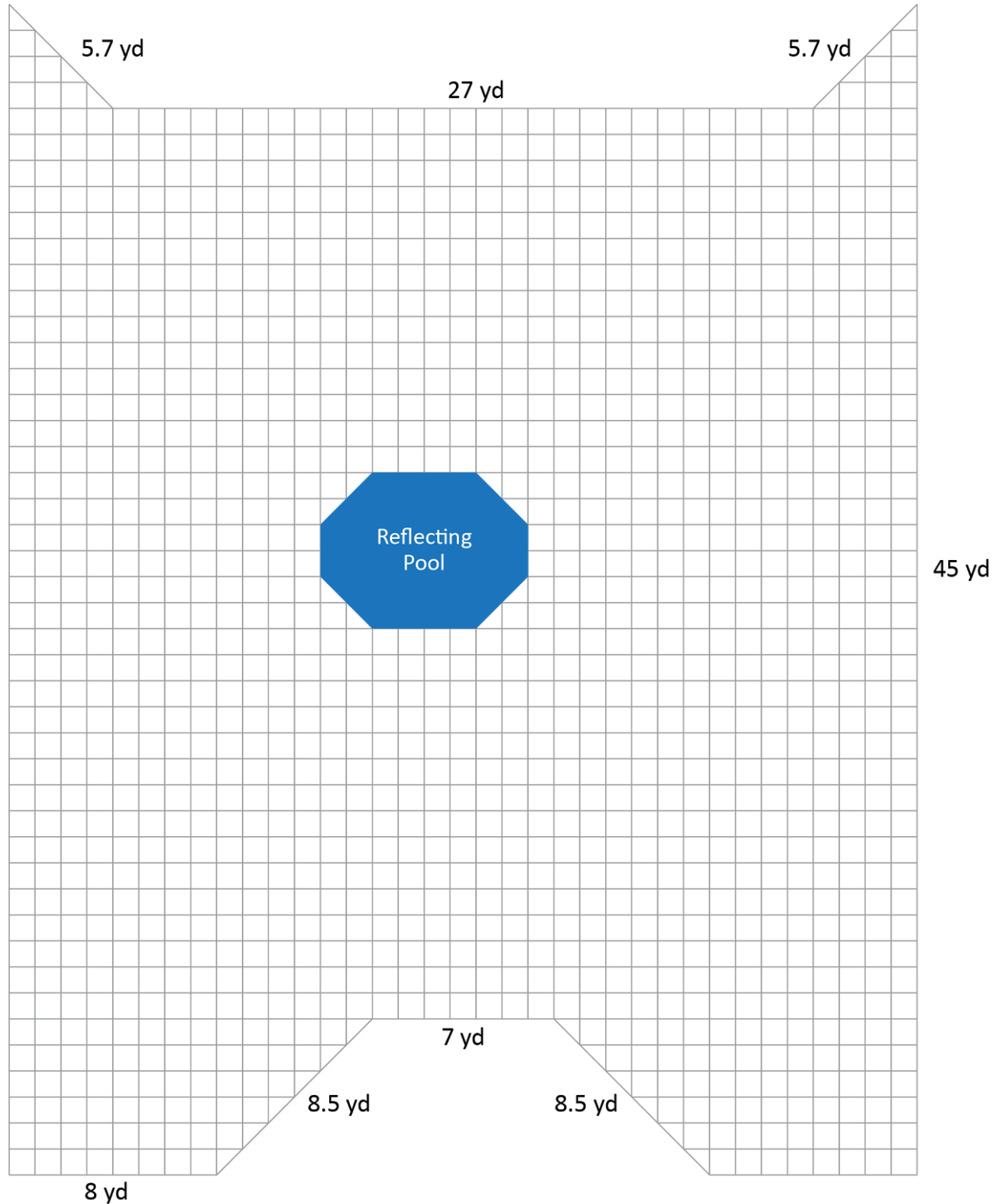




## 1

## Get Started on the Culminating Project

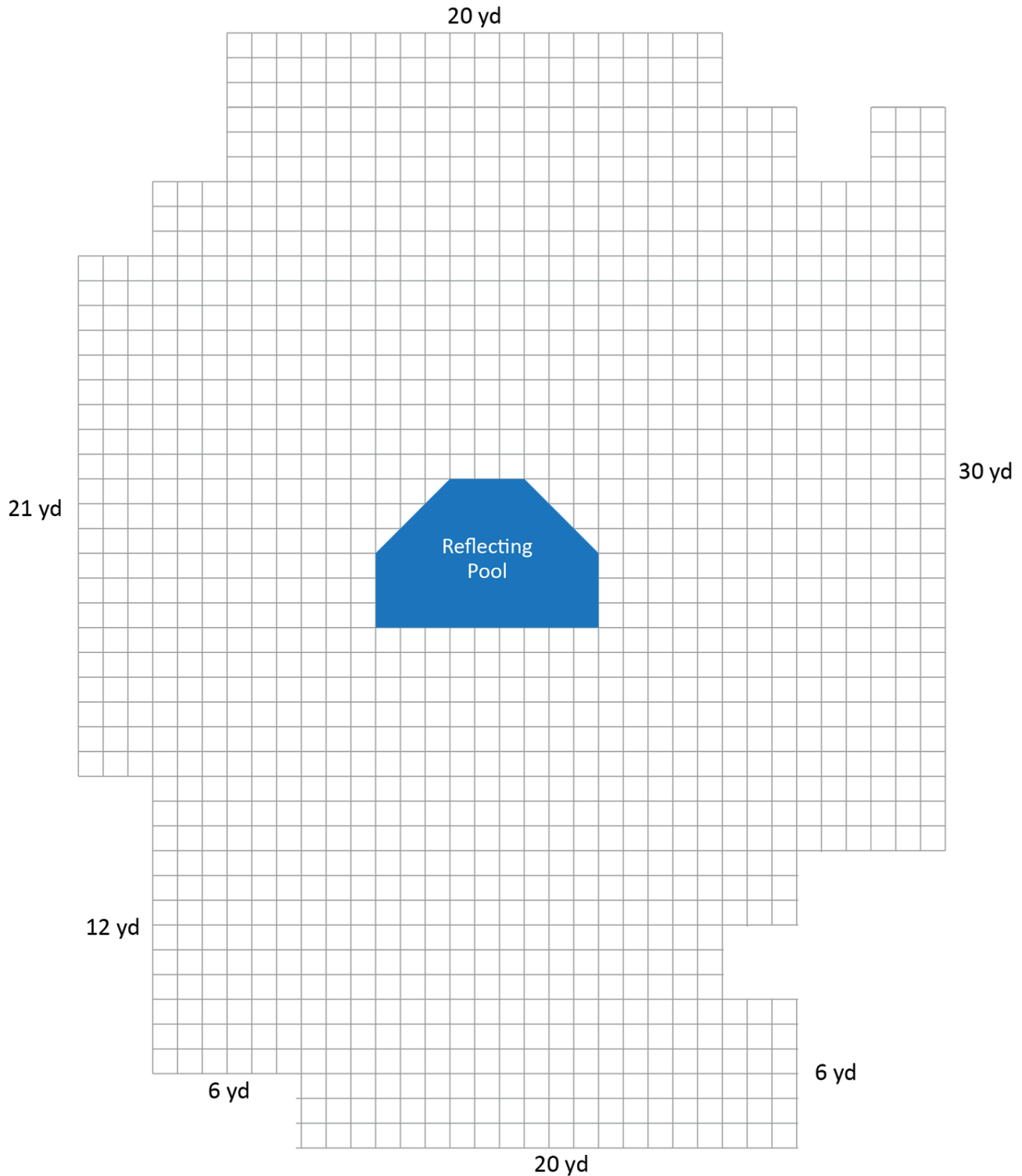
### Noether Playground





## Get Started on the Culminating Project

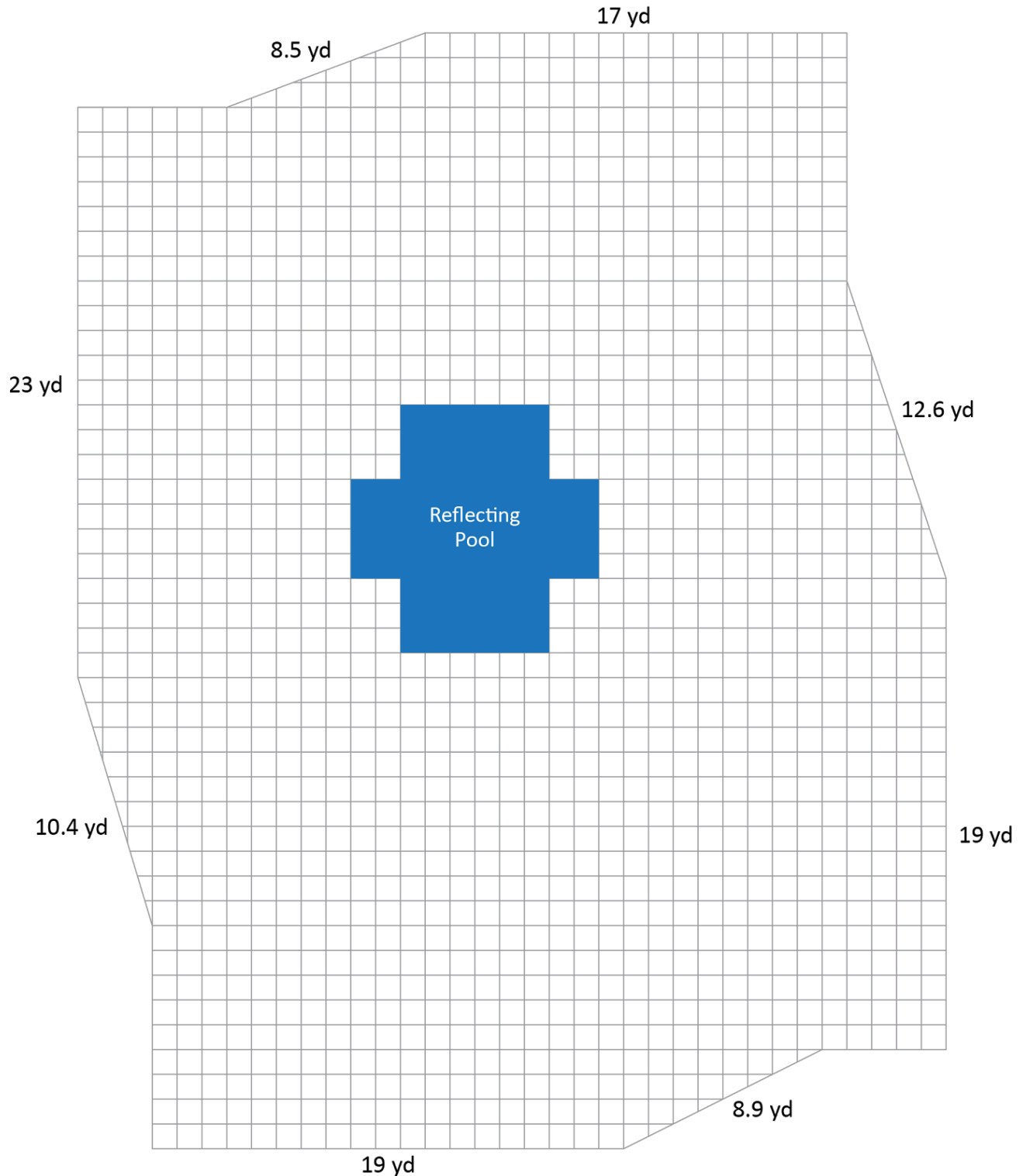
### Pythagoras Playground



## 1

## Get Started on the Culminating Project

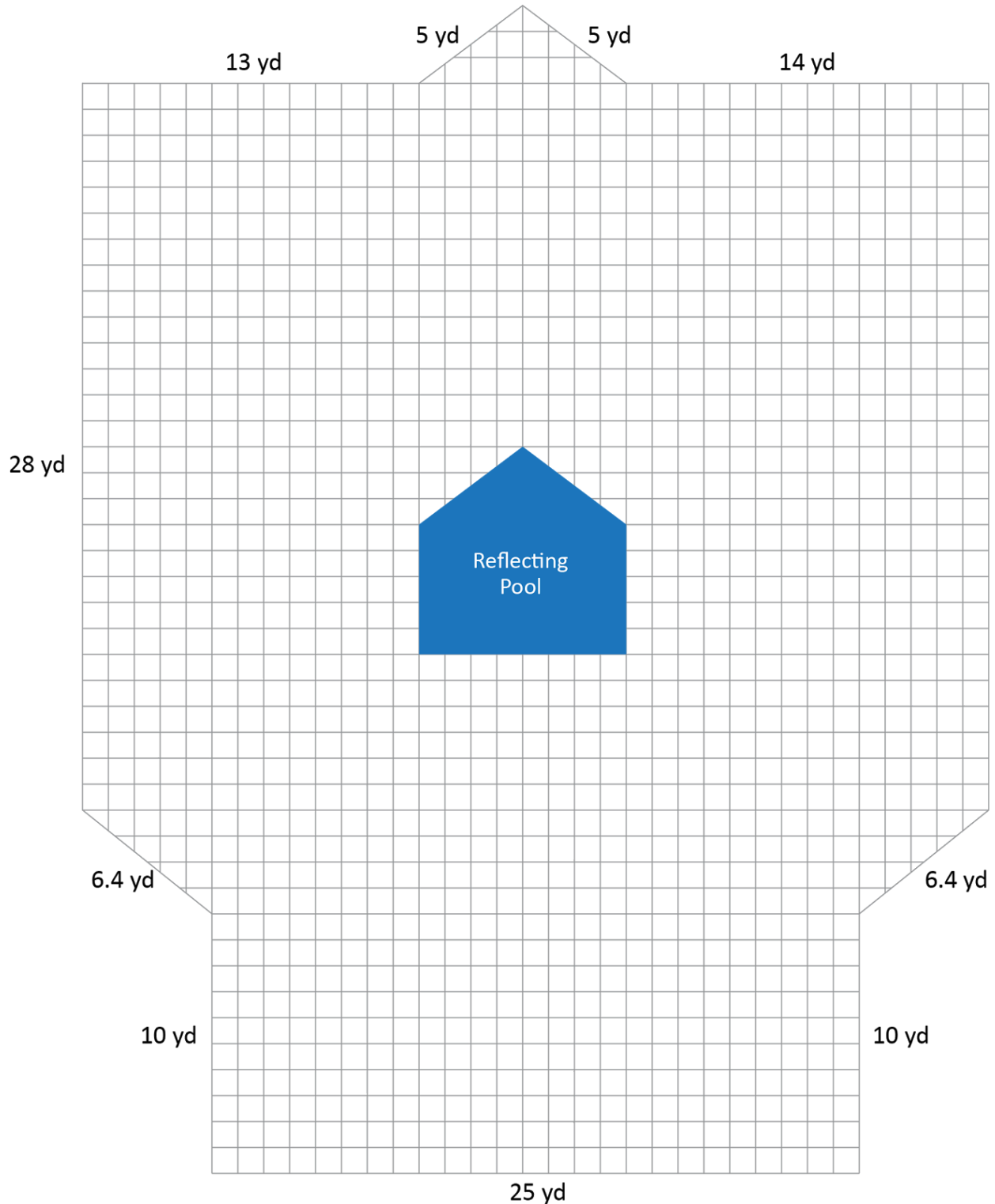
### Ramanujan Playground



## 1

## Get Started on the Culminating Project

### Gauss Playground

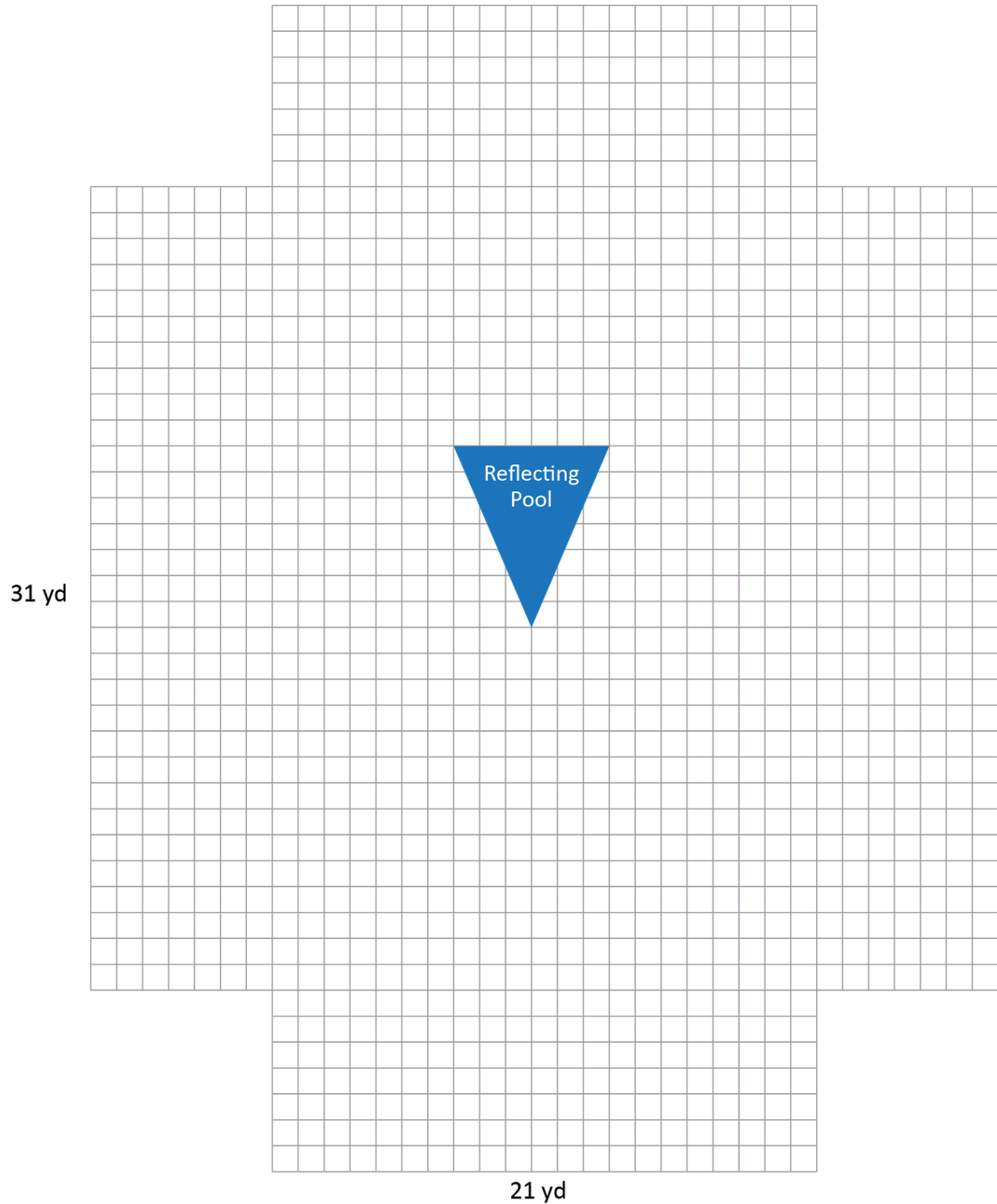






## Get Started on the Culminating Project

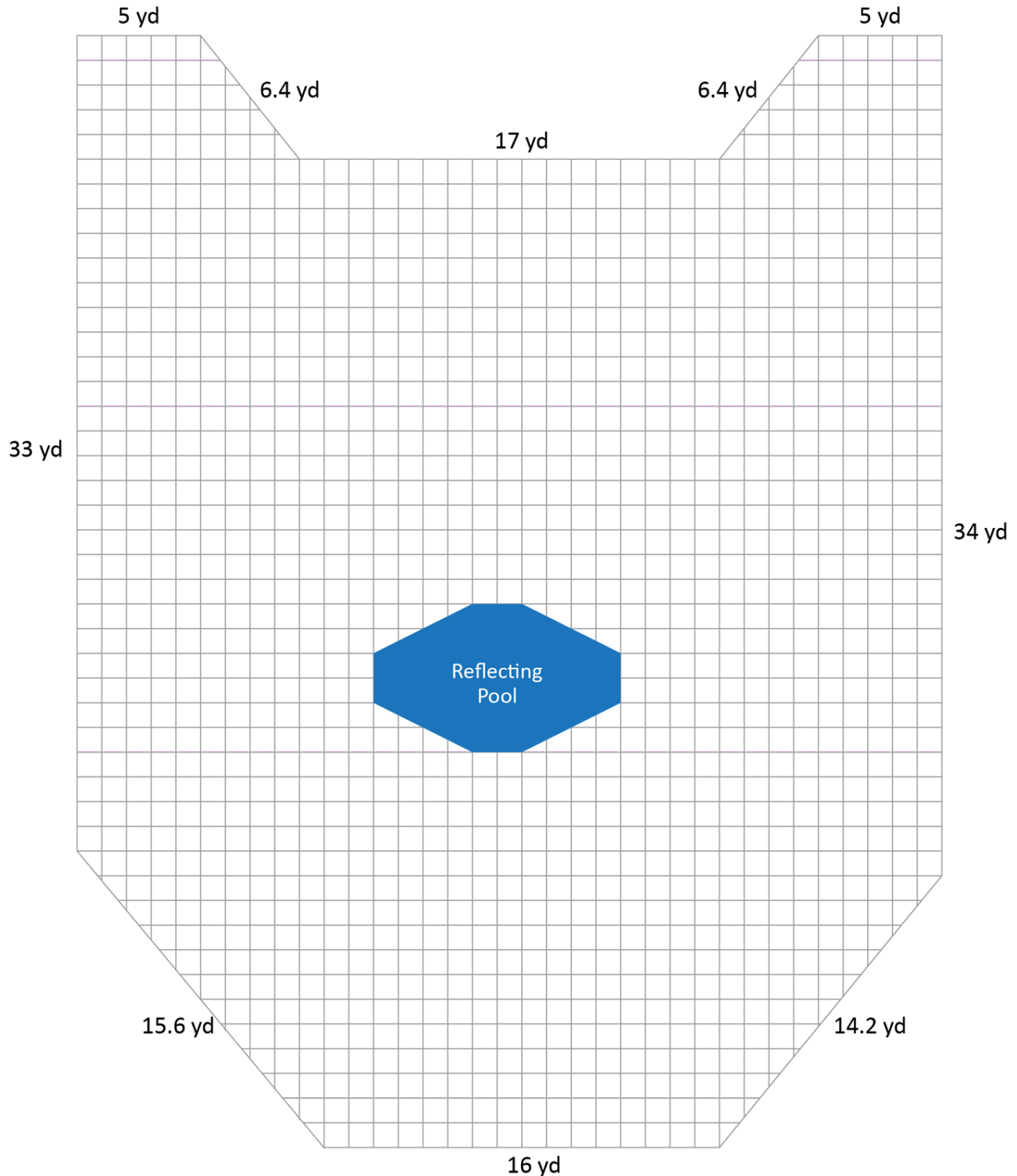
### Descartes Playground



## 1

## Get Started on the Culminating Project

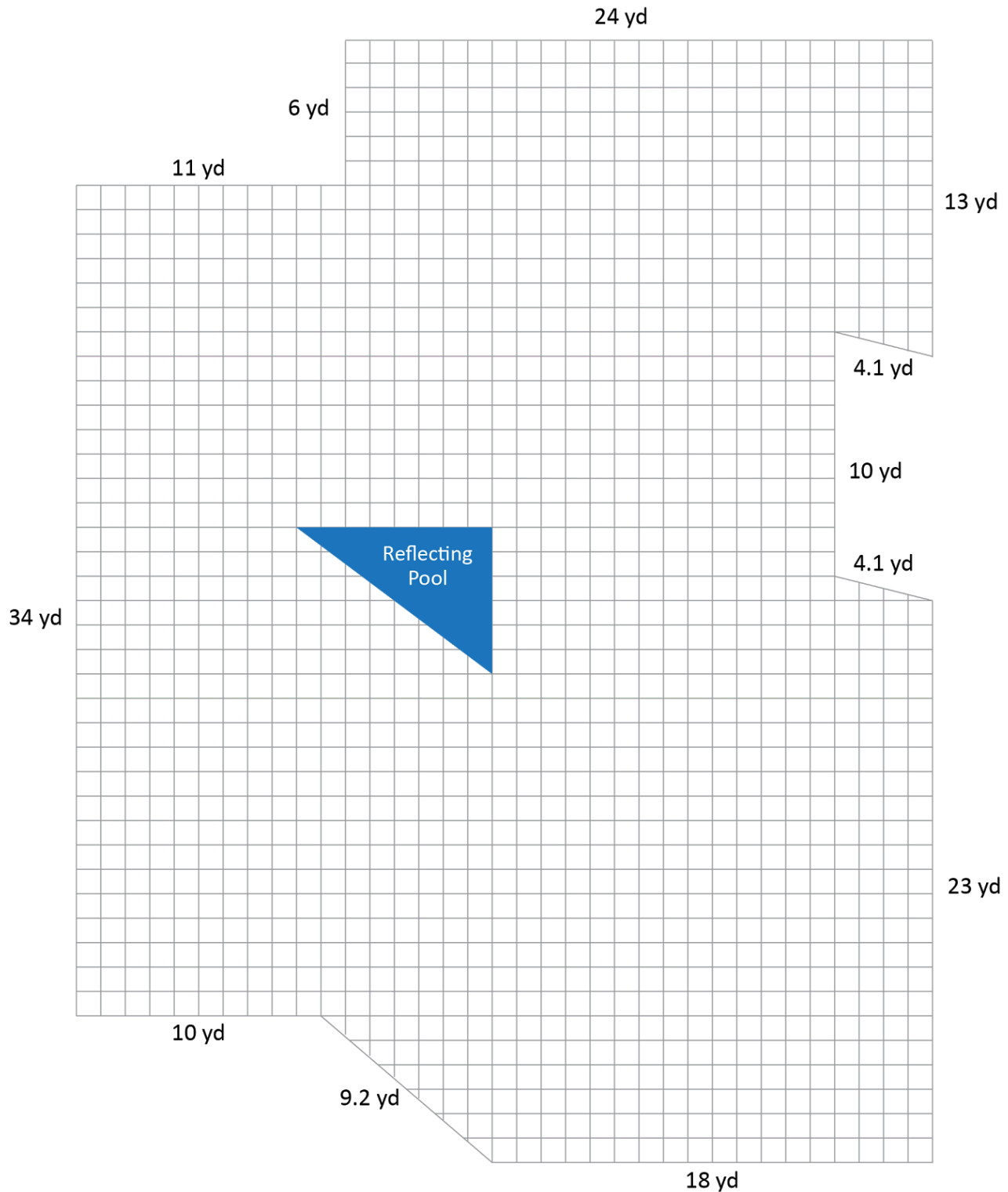
### Euler Playground





## Get Started on the Culminating Project

### Pascal Playground





## Get Started on the Culminating Project

### CHECK FOR UNDERSTANDING • Area of Use Zones

Suppose a group started the following table about their playground. Help finish this group's table. Remember to label all units of measurement. Show or explain how you found the area of the Climbatron 6000.

Name and Model Number	Dimensions for Use Zone	Area of Use Zone
The Eliminator	8' by 12'	_____
Party-Town Funcastle	Length: 36 feet Width: _____	864 square feet
Climbatron 6000	22'6" × 30'8"	_____

How did you find the area of the Climbatron 6000?

## 2

## Area of Shapes

### Parallelogram Shapes in the Real World

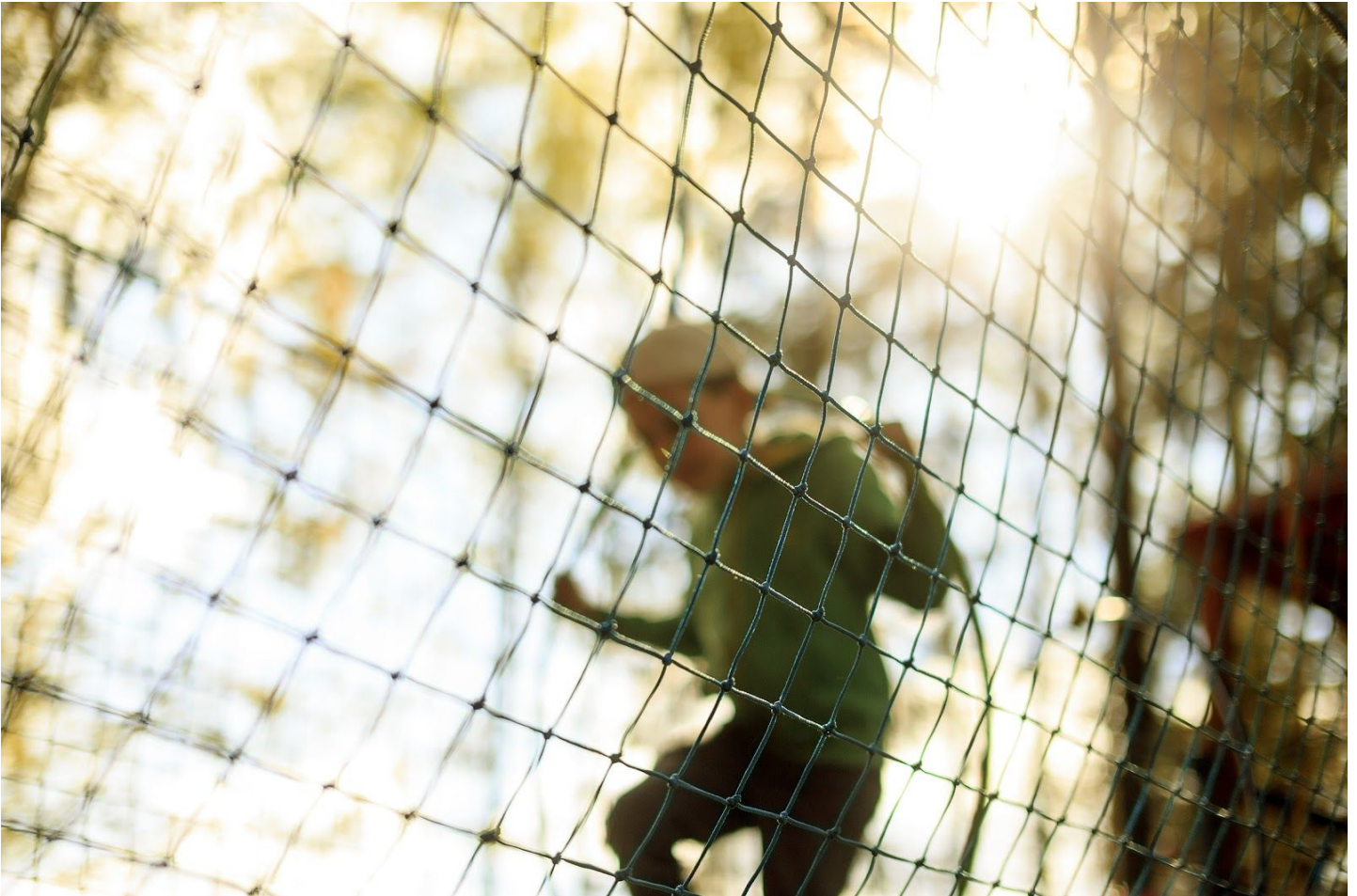




## 2

## Area of Shapes

### Parallelogram Shapes in the Real World





## 2

## Area of Shapes

### Parallelogram Shapes in the Real World





### Parallelogram Shapes in the Real World





## 2

### Area of Shapes

#### Triangle Shapes in the Real World





## 2

## Area of Shapes

### Triangle Shapes in the Real World





## 2

## Area of Shapes

### Triangle Shapes in the Real World





## 2

## Area of Shapes

### Triangle Shapes in the Real World





## 2

## Area of Shapes

### CHECK FOR UNDERSTANDING • Areas of Polygons

Select two of the figures shown.

Use a diagram or words to describe how to calculate the area of each figure you choose. Then find the area.

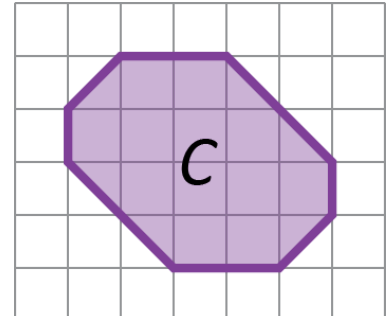
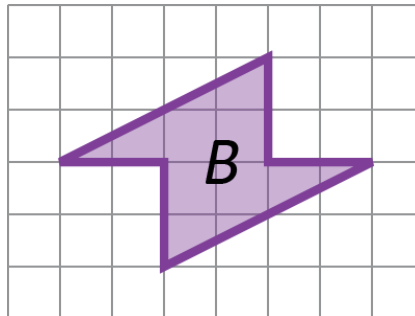
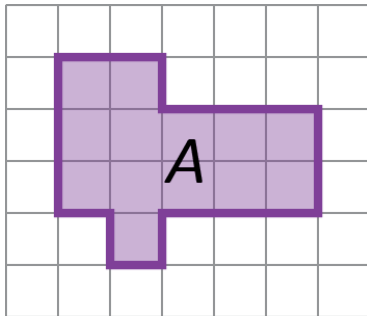


Figure (A, B, or C)	Describe how to calculate the area.	Area

# Coordinate Plane

### CHECK FOR UNDERSTANDING • Draw Polygons on the Coordinate Plane

A sixth grade class needs to build a safety fence around their playground. They use ordered pairs to show where to put the corners of their fence. There will be corners at  $(-3, 1)$ ,  $(3, 1)$ ,  $(-1, -5)$ , and  $(1, -5)$ .

1. What kind of shape will the fence make?
2. If each square on their coordinate grid represents 1 square foot on the playground, how much area will there be inside of the fence?

## 4

## Volume and Surface Area

### CHECK FOR UNDERSTANDING • Volume and Fractions

Marina wants to build a giant ball pit for her playground. Her pit will be a right rectangular prism that is 50 ft long, 25 ft wide, and 12.5 ft deep. She will fill the pit up  $\frac{3}{4}$  of the way so that her friends have room to breathe at the top.

Will 10,000 ft<sup>3</sup> of balls be enough to fill that space? Why or why not?

## GROUP PREVIEW • Garden Boxes

Name \_\_\_\_\_ Date \_\_\_\_\_ Group \_\_\_\_\_

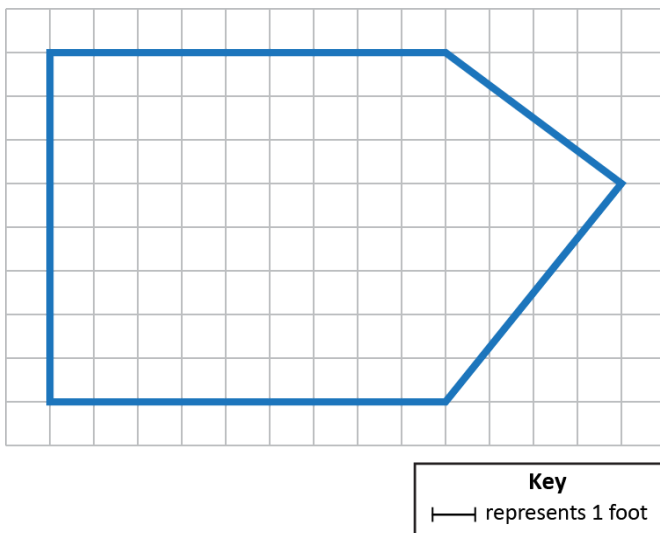
You are designing and building a raised garden box for your school.



### Section 1: Area of the Base of a Garden Box

A classmate created a garden box. Figure 1 represents the base of the garden box.

**Figure 1. Base of a Garden Box Design**



### Group Discussion

- What strategies can you use to determine the area of the base of the garden box?
- Which formula(s) can you use to calculate the area of the base of the garden box?

What is the area of the base of the garden box?

Use words and numbers to explain your work.

## Section 2: Amount of Soil

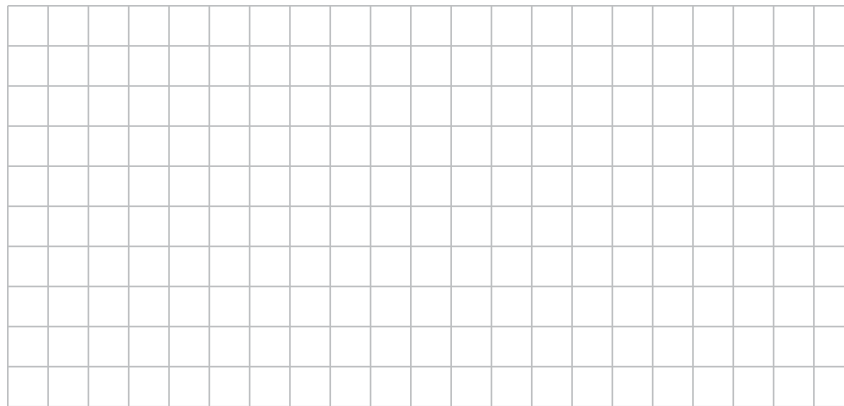
The depth of the soil in the garden needs to be 18 inches. How many cubic **feet** of soil is needed for the raised garden shown in Figure 1?


Use words and numbers to explain your work.

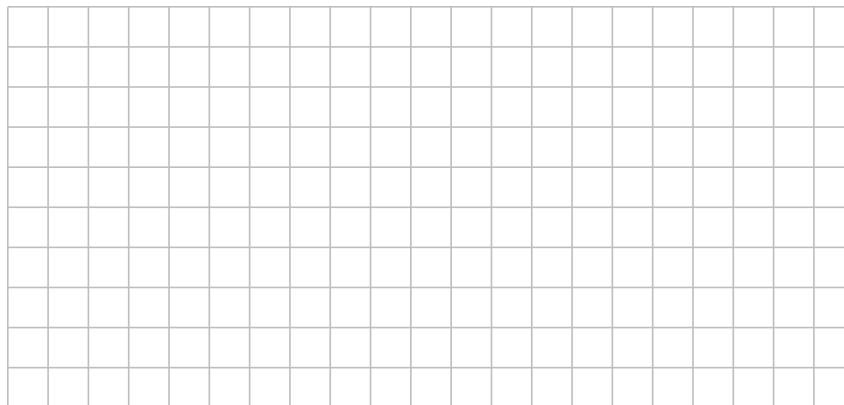
## Section 3: Design Your Own Garden Boxes


You now have the opportunity to be creative and design two new garden boxes. Draw on the graph below to sketch two **unique** bases of garden boxes that meet **all** of the following criteria.

1. The base of the garden box can only use straight lines.
2. The base must have four or more sides.
3. The base must have at least two corners that are **not** right angles.
4. Each corner of the base must be at a **lattice point** of the graph paper. (*Your teacher will explain to the class what a lattice point is.*)



**Key**  
 represents 1 foot



**Key**  
 represents 1 foot

## Discussion Questions

1. Compare strategies and the work completed for Sections 1 and 2.
2. How do you decide if it is better to decompose a figure or to use negative space to calculate the area?
3. How can you verify that your garden design in Section 3 meets **all** of the criteria?



## INDIVIDUAL PERFORMANCE TASK • Garden Boxes

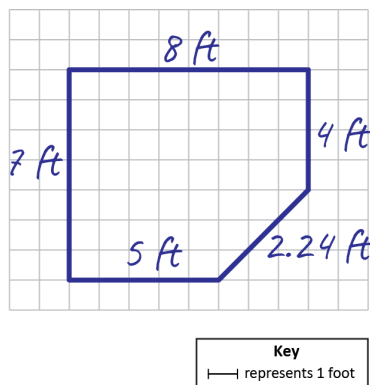
Name \_\_\_\_\_ Date \_\_\_\_\_

### Section 1: Review Annie's Design

Your friend Annie created this design. She says that her garden box base meets all of the design criteria and has an area of 60.5 square feet.

1. The base of the garden box can only use straight lines.
2. The base must have four or more sides.
3. The base must have at least two corners that are **not** right angles.
4. Each corner of the base must be at a **lattice point** of the graph paper. (*Your teacher will explain to the class what a lattice point is.*)

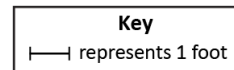
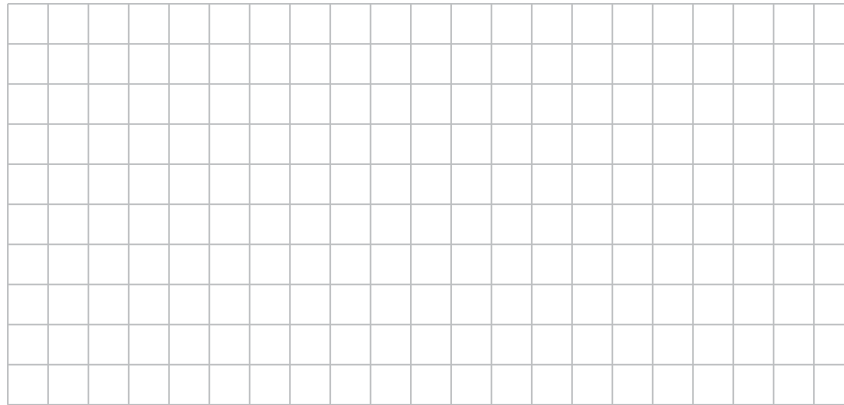
*Annie's Design*



Do you agree with Annie? Explain below why or why not.

## Section 2: Design a Garden Box

Use the grid below to draw the base of another garden box. You can either use a design you created in the group activity, or create a new box that meets **all** of the criteria listed in Section 1.



**Part A:** What is the area of the base of your garden box?

**Part B:** The garden box will have a height of 2 feet. What is the total volume of your garden box?

**Part C:** Experts recommend filling a garden box  $\frac{7}{8}$  of its total volume with soil. How many cubic feet of soil will you need for your garden box? Explain how you determined your answer by showing all work using math, words, and a diagram.