Name:_____

Using Your Coordinate Grid Garden: the distance formula

This activity can be used to incorporate mathematics in any school garden or school yard. It is easy to create a coordinate grid in your current garden. For detailed instructions on how to create a coordinate grid garden, download the directions at http://www.kidsgardening.com/2006.kids.garden.news/feb/pg3.pdf

If a school garden is not available, teachers can do these exercises using the replicated school garden grid (page 5).

Problem 1: Identify the coordinates of several plants or objects in your garden. Write these values in the columns on the table below. Use the extra spaces for additional objects that you map.

Object	X distance from zero	Y distance from zero	Coordinate value (X,Y)
1			
2			
3			
4			

Problem 2: Find the distance between two points in the garden using two different methods: 1) the distance formula and 2) a measuring tape. Compare the two values.

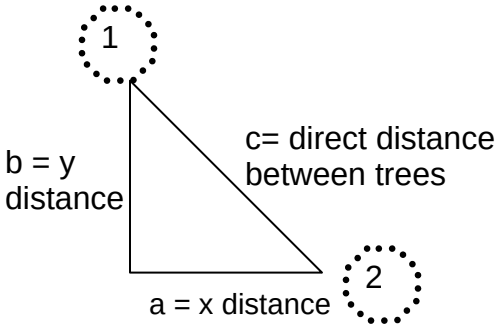
Example:

Tree 1 (1) and Tree (2)

The distance formula comes from the Pythagorean Theorem used to find the length of the hypotenuse of a triangle.

The Pythagorean Theorem states that in a right triangle:

$$c^2 = a^2 + b^2$$



If you substitute the coordinates of *a* (x_1, y_1) and *b* (x_2, y_2) into the formula and solve for *c*, the solution will equal the direct distance between the two points.

Distance Formula: $c = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

Therefore, if tree 1 has the coordinates (3,4) and tree 2 has the coordinates (1,5):

$$c = \sqrt{(1-3)^2 + (5-4)^2}$$

$$c = \sqrt{(-2)^2 + (1)^2}$$

$$c = \sqrt{4 + 1}$$

$$c = \sqrt{5} = 2.24 \text{ ft.}$$

1. Use the distance formula to find the distance between the points below. Write the answer in the data table below.

a. (Object 1) and (Object 2)

b. (Object 2) and (Object 3)

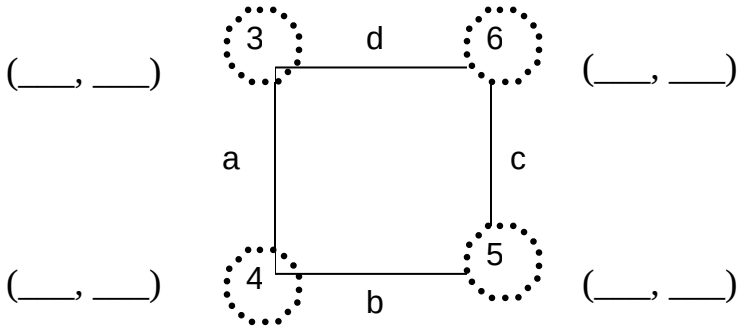
c. (Object 3) and (Object 4)

d. (Object 4) and (Object 1)

2. Now use the measuring tape to find the distance between the two points. Write the answer in the data table below.

Object	1) distance calculated using formula	2) distance measured using measuring tape
1 & 2		
2 & 3		
3 & 4		
4 & 1		

Problem 3: Look at the replicated school garden on page 5. Determine if trees 3, 4, 5, and 6 were planted in an exact square. All sides are congruent, or equal, in an exact square.



3. Write the coordinate values of each of the four trees from the replicated school garden in the above spots.

4. Use the distance formula to find the length of each side (the distance between two trees).

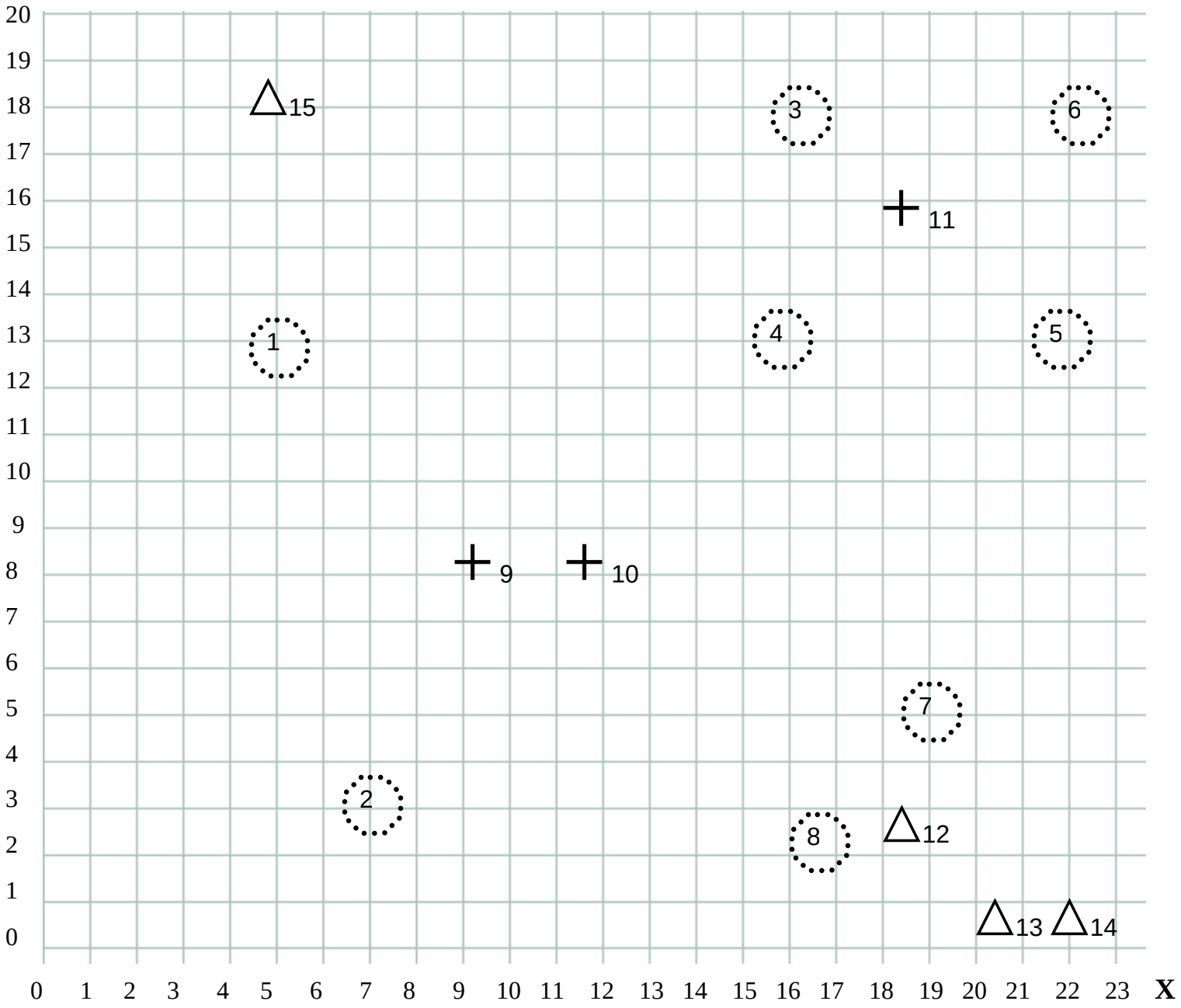
side	distance calculated using formula
a	
b	
c	
d	

5. Are the sides of the square equal (congruent)? Were the plants planted in a perfect square?

6. Why is it a good idea to map a garden before planting?

7. Choose four plants in your school garden. Repeat the procedure above to determine if they were planted in an exact square.

Replicated School Garden



Key:

= tree

= herbaceous plant or grass

= shrub

*measurements in ft