

Ne'epapa Ka Hana 2.0
Sixth-Grade Mathematics Resources
STEMD² Book Series

STUDENT ACTIVITIES

LET'S GO FROM

MAUKA TO MAKAI

STEMD² Research & Development Group
University of Hawai'i at Manoa



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Ne'epapa Ka Hana Sixth-Grade Mathematics Resources

Let's Go from Mauka to Makai
Student Activities

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Unit 5: Equations and Inequalities

In this unit, we'll learn how to use algebraic equations and inequalities to solve problems through exploring different ahupua'a and the lengths of various Hawaiian trees in the ahupua'a. There are three activities in this unit. *Module 11* involves the use of equations and relationships to help describe the growth of native Hawaiian trees. *Module 12* focuses evaluating the distance between neighbors in a ahupua'a with the help of relationships on two variables. The final activity is cumulative and incorporates concepts from each of the previous activities in this unit.



Module 11: Equations and Relationships Activity

This house is built right next to a forest. Near the house are some fast-growing trees.



After x years, the height of the trees (in feet) are given by the following expressions.

Tree	Height after x years
Mai'a (banana)	$2x + 2$
Loulu (palm)	$\frac{3}{2}x$
Niu (coconut)	$3x + 1$
'Ohe (bamboo)	$\frac{5}{2}x + 3$

1. When writing equations and inequalities about these trees, we can replace “the height of the tree” with the expression that describes it.

For example,

“the height of the 'ohe is greater than or equal to 15 feet” can be written as

$$\frac{5}{2}x + 3 \geq 15$$

and

“the height of the 'ohe is the height of the niu” can be written as

$$\frac{5}{2}x + 3 = 3x + 1.$$

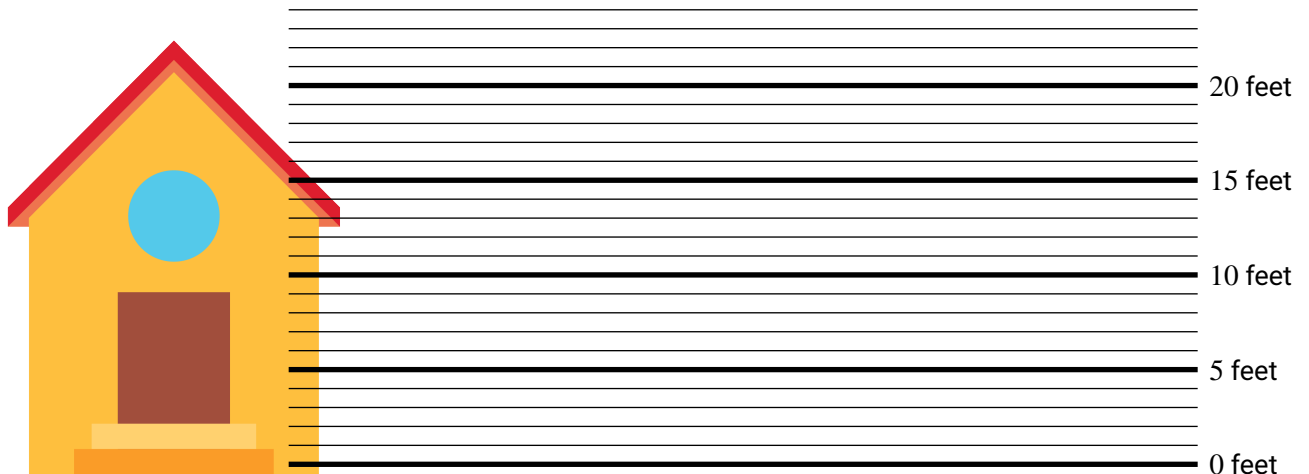
Write the equations and inequalities for each of the following sentences. You **do not** need to solve them.

- (a) The height of the loulu is 3 feet.
- (b) The height of the niu is half of the height of the mai'a.
- (c) The height of the mai'a is less than the height of the 'ohe.
- (d) The height of the niu is 2 feet more than the height of the 'ohe.

2. How tall will each tree be after 2, 4, and 6 years?

Number of years	Tree height (feet)			
	Mai'a	Loulu	Niu	'Ohe
x	$2x + 2$	$\frac{3}{2}x$	$3x + 1$	$\frac{5}{2}x + 3$
2		3		8
4			13	
6	14			

3. Draw the trees after 6 years ($x = 6$).



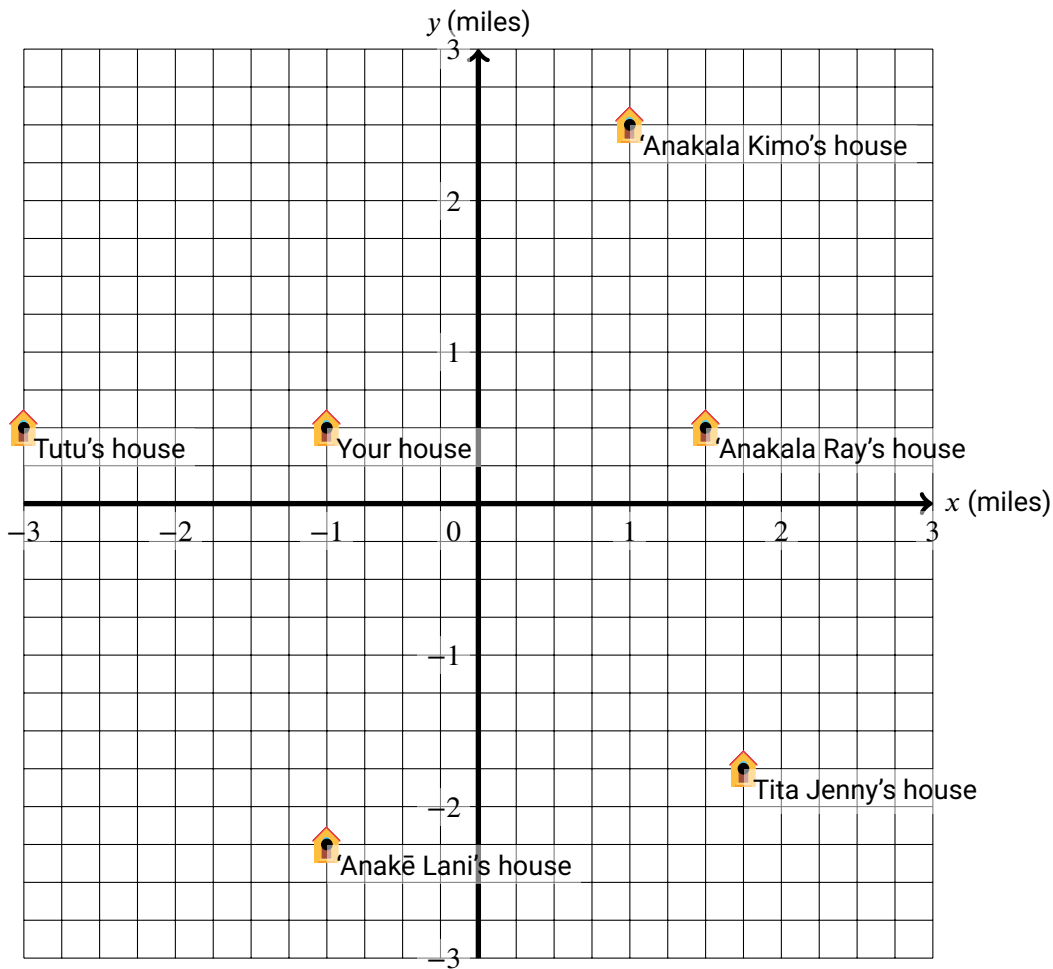
4. There is a 15-foot tall power line connected to this house. We need to make sure that the trees doesn't grow as tall as the power line.

(a) Which tree(s) would reach the power line in 6 years?

(b) What are three things that we can do to the trees if they get too tall?

Module 12: Relationships in Two Variables Activity

You and your 'ohana (family) live in this ahupua'a. Here is a map of your ahupua'a.



1. If you only move left, right, up, or down (not diagonal or in a curve), how many miles away **from your house** does each relative live?

(a) Tutu

(d) 'Anakala Kimo

(b) 'Anakala Ray

(e) Tita Jenny

(c) 'Anakē Lani

Unit 5: Cumulative Activity

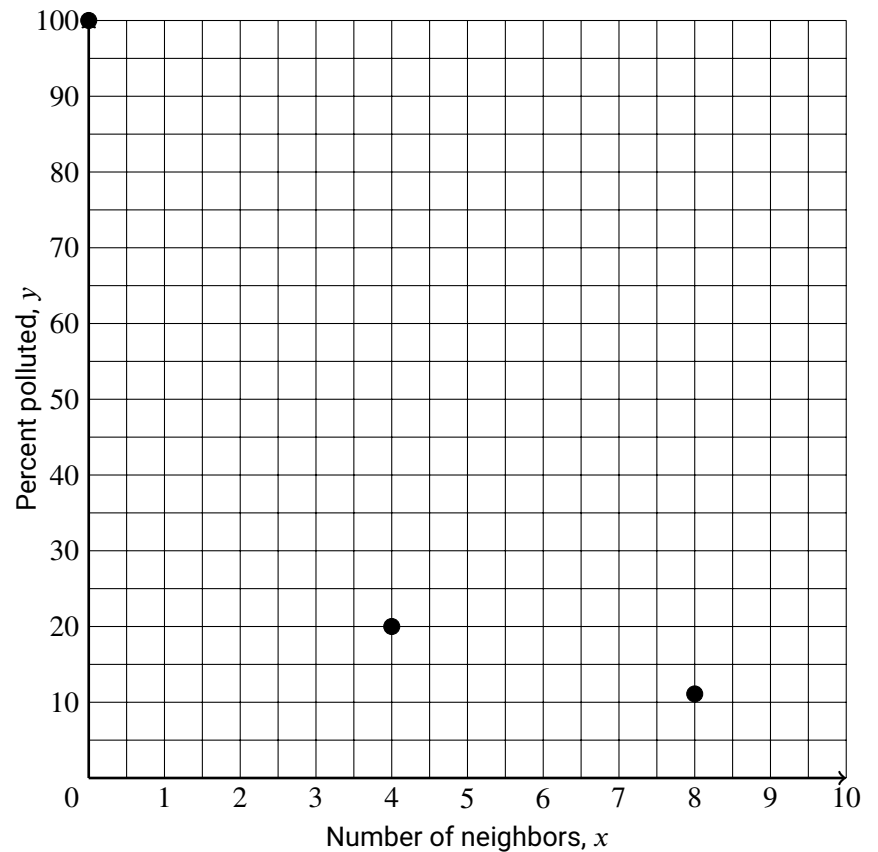
A pond in your ahupua'a is badly polluted. You want to clean it up but, it is big pond and you wont be able to clean it alone so you decide to ask some of your neighbors to help out.

1. If x is the number of neighbors who will help, write an expression for the total number of workers (including yourself) who will clean up the pond.
2. The percent of pollution remaining in the pond can be given by a simple algebraic equation: "The *percent of pollution* is 100% divided by the *total number of workers* cleaning it up." Write this algebraic equation for percent of pollution, y in terms of number of neighbors, x .

3. Complete the following table (round to one decimal place, if needed).

Number of neighbors, x	Percent polluted, y
0	100
1	
2	
3	
4	20
5	
6	
7	
8	11.1
9	
10	

4. Graph the data from the previous table.



5. The graph in part 4 only shows Quadrant I. Do you think there is important information in any of the other three quadrants? Why or why not? Feel free to discuss with your friends.

Due to the pollution, there hasn't been a lot of animals visiting this pond.

6. Birds will return to the pond if it is less than 15% polluted. Modify the equation from part 2 to describe this as an inequality in terms of x .

7. Use the previous table or graph to answer this question. How many neighbors need to help in order to get this pond clean enough for birds to return?

At the end of the cleanup effort, the birds started to return to the pond. Here are the number of birds, b , d days after the cleanup.

Days (d)	0	1	2	3	4	5	6
Birds (b)	0	3	6	9	12	15	18

8. Which variable, b or d , is the independent variable, and which variable is the dependent variable? How do you know?

9. Write the equation for b in terms of d .

10. With a partner or in the online comment section, describe a place that you have been to that was really polluted. Describe what it would look like if people took the time to clean it up. 