

Math in Nature

Let's Investigate

Gardens!



Hi! I hope you enjoy exploring math with us this year. I created these pages for my children and I am happy to share them with you, so your family can enjoy them also. I have tried to include a variety of activities that can be used with children of all ages. Just print off the activities that you think will suit your children. Most of the activities are investigative, so you won't need an answer book. If you get stuck please email me and I will be happy to help. If the activities are research based questions I will provide links to help with finding the answers. I have also included a list of books, or web pages, you might enjoy to explore while looking at the topic. I hope you enjoy these investigations!

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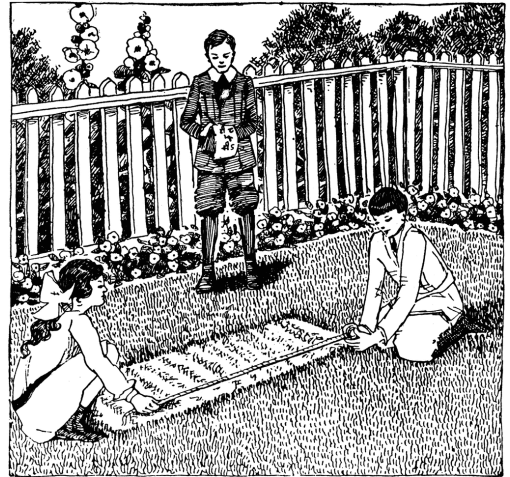
Front cover picture: L. H. Bailey *Garden-Making* (New York: The Macmillan Company, 1898) 348

Measuring a Garden (you will need a measuring tape for this activity and flour)

Can you use a measuring tape? Take a measuring tape and look at the marks on it. How long is the tape? What is the smallest measurement on the tape?

Bring it outside and measure a line of 1m. Use flour to mark the line. Measure more lines to make a square, each side being 1m. Use the flour to mark your lines. The lines of flour show the PERIMETER of the square. We work out the PERIMETER by adding all the sides. ($1+1+1+1=4m$)

Make some more squares of different sizes with your tape measure and flour. Work out their perimeters.



The Gardener

By Robert Louis Stevenson

*The gardener does not love to talk,
He makes me keep the gravel walk;
And when he puts his tools away,
He locks the door and takes the key.*

*Away behind the currant row,
Where no one else but cook may go,
Far in the plots, I see him dig,
Old and serious, brown and big.*

*He digs the flowers, green, red, and blue,
Nor wishes to be spoken to.
He digs the flowers and cuts the hay,
And never seems to want to play.*

*Silly gardener! summer goes,
And winter comes with pinching toes,
When in the garden bare and brown
You must lay your barrow down.*

*Well now, and while the summer stays,
To profit by these garden days
O how much wiser you would be
To play at Indian wars with me!*



Math on a seed packet: (You will need a packet of seeds for this activity)

Have you ever looked closely at a packet of seeds? You can find a lot of information to help you grow your seeds successfully. Some of the information tells you what time of year to sow your seeds. Find this on a seed packet, work out when it is best to plant the seeds.

Can you also find the following?

How large the plant will grow? _____

How deep to plant the seed? _____

How long it will take before the seedlings show? _____

How far apart to plant your seedlings? _____

If you have flowers or vegetables, how long before the plant flowers or you can harvest the vegetables? _____

Recording data.

What you will need:

- *Two different kinds of seeds*
- *Seed raising mix*
- *Two containers to plant your seeds*
- *A note book to record your data*
- *A ruler*



Label the containers, one for each different kind of seed. Sow your seeds in the seed raising mix. Keep them watered and in a warm, sunny spot. Check your seeds each day. Record each day what you see. As the seedling grow measure their height. Graph your data on a line graph using a different colour for each kind of seed. You can see an example [HERE](#).

Garden Design:

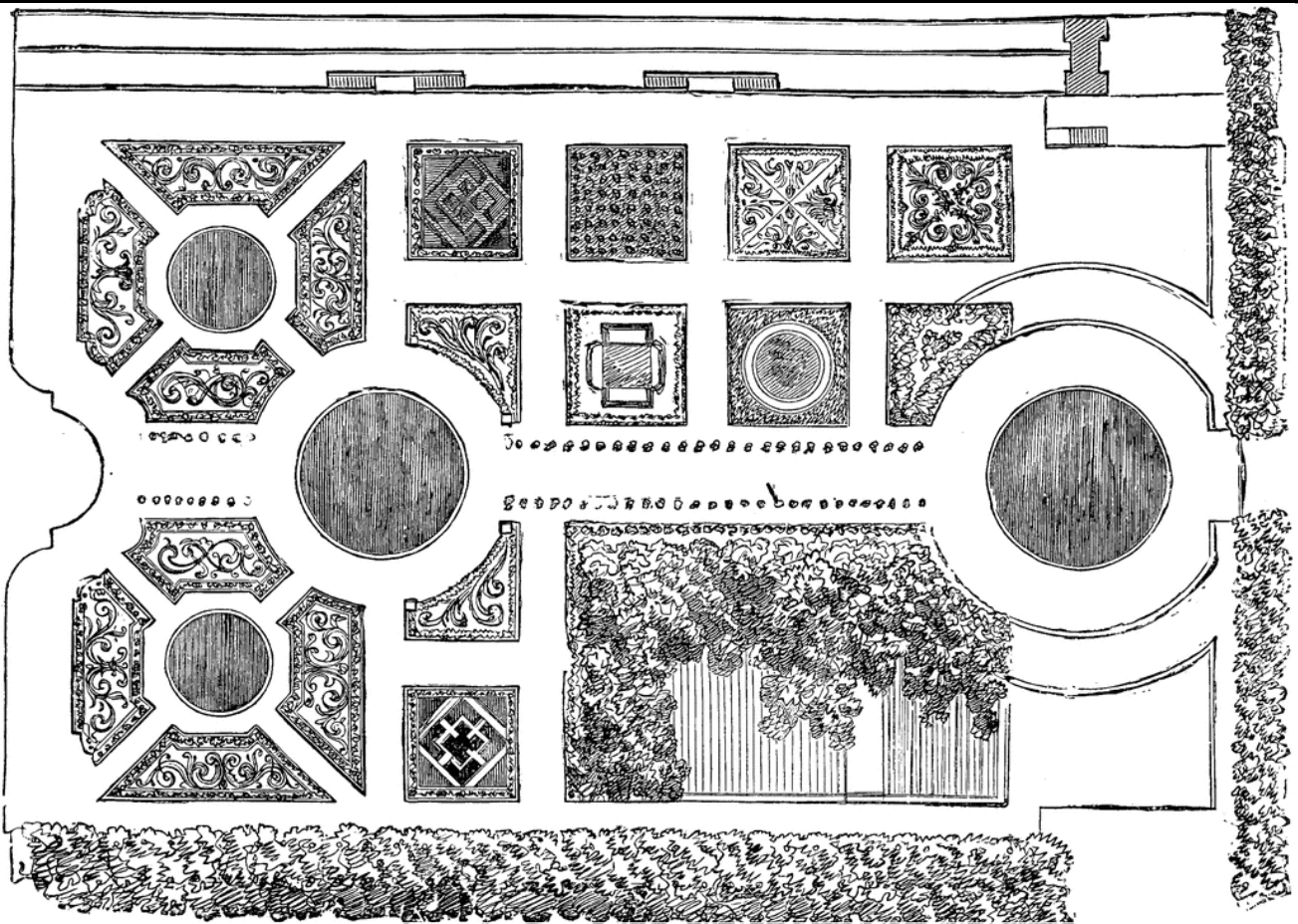
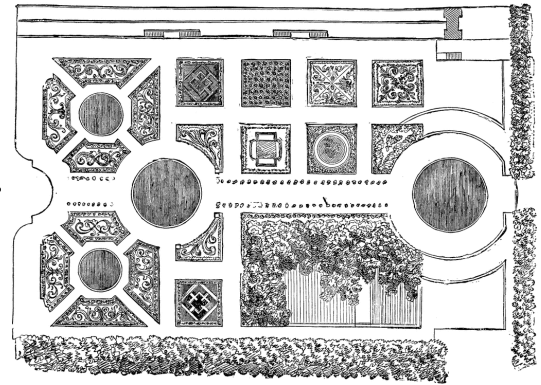
Garden designers use measurement and geometry to create beautiful spaces for us to enjoy. Visit a botanic, or public garden or download a map of a famous garden. Take notice of the shapes you see. Can you find circular gardens or ponds? What shape are the garden beds? What do you notice about the paths. Do you notice any areas of symmetry?

Create a map of your dream garden.

Calculate the perimeter and area of your overall garden and the individual garden beds.

Challenge (for the older students):

make sure your map is done to scale. Include a scale, legend and compass directions.



This is the garden plan of the Tuileries Garden in the time of Louis XIII in France.

Composting and Micro-Organisms

Micro means extremely small. Our Garden dirt is full of micro-organisms that help breakdown materials to produce nutrient rich soil. For this activity you will need:

- Large glass jar
- Soil from your garden
- Newspaper
- Kitchen vegetable scraps
- Leaves, straw, dried garden refuse
- 1 cup fresh rainwater

(Extension: weigh all the ingredients, before and after the experiment)

In your jar layer the soil newspaper, scraps and garden waste. For the top layer use your straw or leaves. Pour in the water. Cover with a lid which has some holes punched in for air. Place your jar in a sunny spot out of reach of little hands.

Draw a line to where the mixture fills the jar. Every week draw a line where the mixture has settled. At the end of twelve weeks pour out your mixture into your garden, write down your observations.

My Mini Compost Experiment

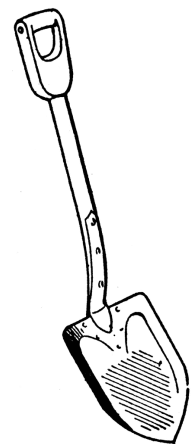
What I placed in my jar:

Measurements

Week 1 _____
Week 2 _____
Week 3 _____
Week 4 _____

Week 5 _____
Week 6 _____
Week 7 _____
Week 8 _____
Week 9 _____
Week 10 _____
Week 11 _____
Week 12 _____

What I observed:



Advanced Math Activities

Research: Do a research project on the Garden of Versailles. Include information that shows how garden designers use mathematics to create beautiful gardens.

Helpful Links

The [Encyclopedia Britanica](#)—information on Versailles.

This article about [Math in the Garden by Todd Haiman](#) might also be helpful.

Research: Scientists are looking at the possibility of growing plants in space! What kinds of problems do you think will need to be overcome before we can plant gardens in space?

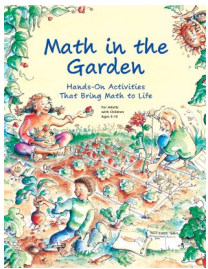
Write a newspaper article describing the kinds of experiments and research that needs to be done before we can enjoy a botanical garden on the moon!

Helpful Links

[NASA—growing plants in space.](#)

[Science ABC](#) tells us how scientist grow plants in space.

Books, videos and links that you might find helpful...



Math in the Garden by Kidsgardening.org

Video Links

[15 Most Beautiful Gardens](#)

[Math in the garden](#)

[Farmer George—Apples](#)

Links

[University of Manchester—unit on Micro-organisms](#)

[More on composting from UGA](#)

[Kids Gardening.org](#)

Math Skills and Terms to learn this month:

Time: recording and comparing the growth, over time, of plants. Recording the change, over time, of organic compost material.

Measurement: Using a tape measure to work out perimeter.

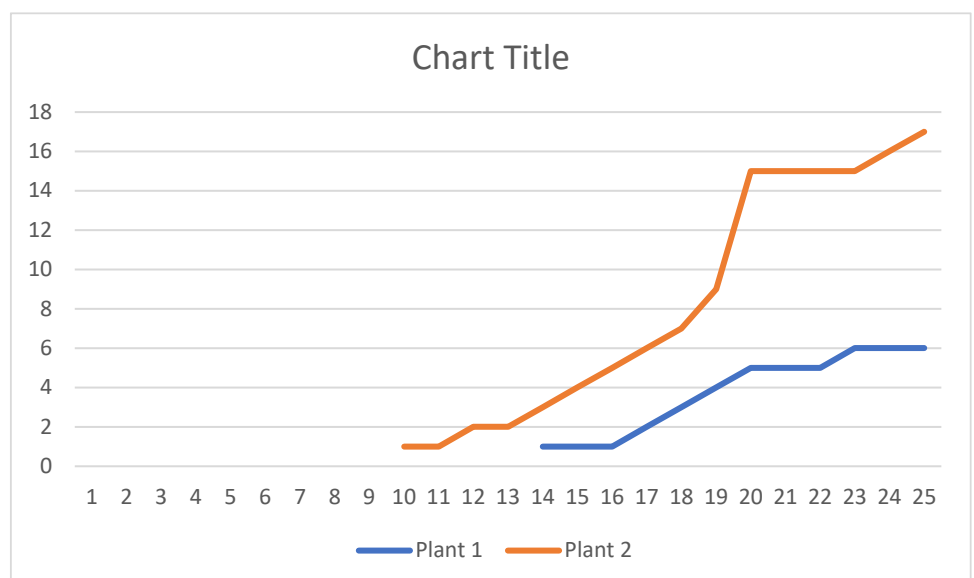
Understanding number in information: reading the information on seed packets, garden maps and signs.

Graphing Data: Using the data recorded, create graphs of information,

Scale: understanding how scale works in plans and maps.

Day	Plant 1	Plant 2
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		1
11		1
12		2
13		2
14	1	3
15	1	4
16	1	5
17	2	6
18	3	7
19	4	9
20	5	15
21	5	15
22	5	15
23	6	15
24	6	16
25	6	17

Data Table and Line Graph example for the growth of two different plants:





*Botanical Garden
Scavenger Hunt
Cards*

Instructions

- *Print these card on cardstock or laminate them.*
- *Cut, punch a hole in the left corner and thread onto a ring.*
- *Take the cards with you when you visit a botanical garden, look around not just at the plants but the signs, maps, paths, statues, and buildings.*
- *For extra fun take photos of the things you find!*

Shapes



- A Circle*
- A Rectangle*
- A Hexagon*
- An irregular polygon*

Size



- A small plant*
- A tall plant*
- A small flower*
- A thick stem*
- A thin stem*
- A long leaf*

Numbers



- A plaque with a date
- A sign with a measurement
- An ordinal number (1st, 2nd etc)

Counting

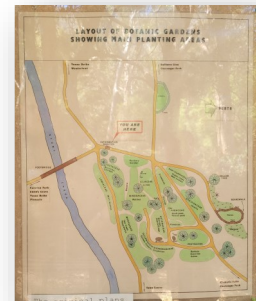


- How many different zones are in the park
- How many sculpture
- How many fountains
- How many seats

Information detective

- When was the park first opened to the public?
- What is the oldest plant, how old is it?
- How many different kinds of plants are in this garden?
- How many visitors come the park each year?

Maps



Using a copy of the park map find:

- The toilet block
- The centre of the garden
- The eastern edge
- A fountain