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Final Project
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A Quantitative Analysis of the Cost of Vertical Gardening

I am one of those unusual people who enjoys working in dirt. I love the smell of composting leaves and moist soil. I get a thrill at seeing new life come from a previously dormant seed. I marvel at the life that emerges from a small seed when the right elements come together. I can hold an entire garden of seeds in my hand, but when those seeds are placed in soil, and combined with light, water, and compost a miracle happens. They turn into plants that grow into delicious vegetables. Many arm loads full of vegetables. I can enjoy such a variety of life from a relatively small portion of seeds.

In this essay, however, we are not going to discuss the miracle of life or the intrinsic value that I place on my gardening experiences as I connect with nature on a very personal level. Instead, we will analyze the financial costs of growing a vertical garden. We will base this analysis on the cost of different materials needed to create a vertical garden. The ideas for my vertical garden will be modeled mathematically as we walk through the planning and implementation phases I went through when creating the garden I designed at my new home this year. We will determine the amount and cost of soil and soil additives needed as well as the number of seeds, plants, and support materials required to prepare our garden.

Garden Design and Soil Needs.

The first step in designing a garden is determining the area of the garden space you have to work with. The space, or area, you have to work with will determine the design you will be able to implement. The plot of dirt used for this research paper is a 23 foot wide by 25 foot long rectangle of bare ground located in the side yard of my home. The **area of this space** is determined by multiplying the width by the depth in feet. $23\text{ft} \times 25\text{ft} = 575$ square feet. The total square footage of our garden is 575 square feet.

In designing my garden layout, I decided to implement a method used by many vertical space gardeners which is the use of dirt raised beds. Dirt raised beds, using soil to create flat topped dirt rows approximately 6 inches high, “greatly increase the chance for productivity” in the garden (Gilbertie & Sheehan 13). It has also been determined that “raised beds drain easily and give a generous soil depth (Full 13). According to Sal Gilbertie, the owner of the largest herb

grower in the United States and an avid home gardener, the “most important benefit [of raised beds] is the greater yield you will achieve with this approach” (14). Gilbertie states that,

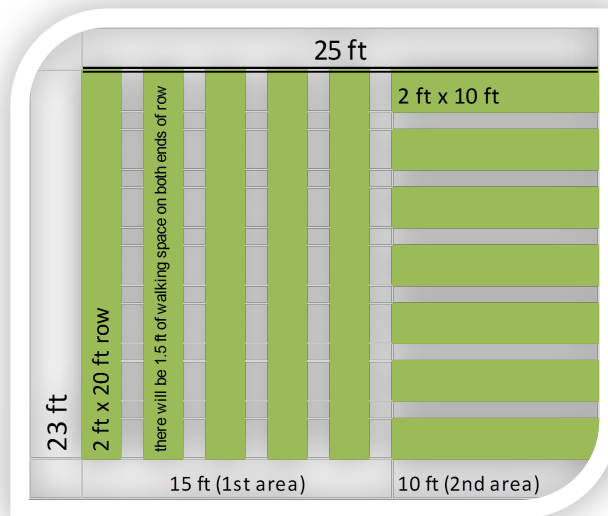
“In a traditional home garden, according to Ohio State’s extension service, good management of crops may produce about .6 pounds of vegetables per square foot. Records of production over 3 years in a raised bed at Dawes Arboretum near Newark, Ohio, indicate an average of 1.24 pounds per square foot” (14)

What then, is the difference in vegetable yield between planting your garden in traditional flat rows versus in raised rows? To determine this we will find the **absolute and relative difference** in the numbers provided by Gilbertie. To determine absolute difference, the following calculations are made: $1.25 \text{ lbs} - .6 \text{ pounds} = .65 \text{ pounds}$. Crops grown in raised beds yield .65 pounds more per square foot than in traditional rows. The relative difference in yield is the absolute difference/reference number. The calculation follows: $.65/.6=1.083$. Crops grown in dirt raised beds yield approximately 108% more vegetables per square foot than in vegetable yields achieved in traditional rows.

After deciding that I wanted to grow my garden in dirt raised beds for the increased yields other gardeners have seen, the next step is to determine the layout and amount of rows which will fit in my garden space. We will begin by breaking this space up into two areas. The first area will be 15 ft long by 23 ft wide with the remaining area 10 feet long by 23 feet wide. We will be planting in straight rows so as to use the available space more efficiently and to make it easier to cultivate the plants as needed (Gilbertie & Sheehan 18). Each rows should be made 2 ft wide and will be raised because “raised beds drain easily and give a generous soil depth (Full 13).

For the first area, we need to determine how many 2 foot wide rows can fit in a garden space 15 feet wide if there must be a 1 foot wide pathway between each row. We will **solve for the variable** as shown in the following calculation: $2x+x=15 \text{ ft}$ (add $2x+x$) $3x=15 \text{ ft}$ (divide both sides by 3) $x=5 \text{ rows}$. So we will create five 2 foot by 20 foot dirt raised rows in the first space.

For the second area, we need to determine how many 2 foot wide rows can fit in a garden space 10 feet wide by 23 feet long. Or in other words, how many 2 foot wide rows can fit in a garden space 23 feet long if there must be a 1 foot wide pathway between rows? We will once again solve for the variable as shown in the following calculation: $2x+x=23$ feet (add $2x + x$) $3x=23$ feet (divide both sides by 3) $x=7.6$. Lets round down and create seven 2 foot by 10 foot rows. Our basic garden plot will be laid out as shown in the following diagram:



Soil & Soil Additives

Once we know how many rows we will be creating and their measurements, it is time to determine the amount of soil additives (compost) we will need to add to the basic soil found in the garden space. According to Derek Full, author of *Vertical Gardening, Grow Up, Not Out, for More Vegetables and Flowers in Much Less Space.*, recommends that we add a composted manure blend to the depth of 3 inches in creating our raised rows (20).

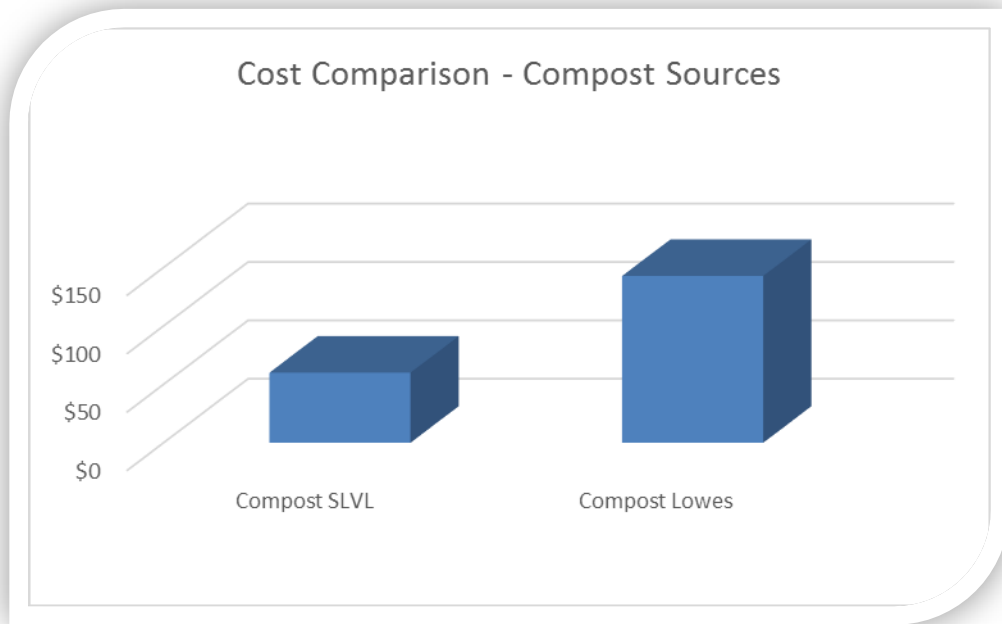
If I have five 20 ft by 2 ft dirt beds in my garden and seven 10 ft by 2 ft dirt beds, how many cubic feet of compost material will I need to order? Melinda Myers, a respected gardening blogger, outlined a four step method for determining the answer to this question. First, we need to **determine the area** being covered. We will use the following calculations. Multiply the width of the row by the length of the row and then multiply your answer by the number of rows. $2\text{ft} \times 20\text{ft} \times 5[\text{rows}] = 200$ square feet for our 2ft x20 ft rows; $2\text{ft} \times 10\text{ft} \times 7[\text{rows}] = 140$ square feet for our 2 ft x 10 ft rows. Add both of those results together ($200\text{ sq ft} + 140\text{ sq ft}$) for our total planting area of 340 square feet. Second, we need to determine the cubic ft of material being added to our area. To do this we will multiply the depth of the material, in feet, that we will want to incorporate. As

we will be adding 3 inches to our beds we will need to **convert inches into feet** as follows. 3 inches x 1 ft/12 inches. The inches cancel out (3 ~~inches~~ x 1 ft/12 ~~inches~~) and we are left with 3 ft/12 which equals .25 ft deep. Third, we will determine the cubic yards needed by first multiplying the area of our rows (340 ft²) by the depth in feet (.25 ft) as follows: 340 ft² x .25 ft = 85 cubic feet. And finally **converting 85 cubic feet into cubic yards** as follows:

$$85 \text{ ft} \times \text{ft} \times \text{ft} \times \frac{1 \text{ yrd} \times 1 \text{ yrd} \times 1 \text{ yrd}}{3 \text{ ft} \times 3 \text{ ft} \times 3 \text{ ft}}$$

The ft cancel out and we are left with 85 cubic yards / 27 = 3.15 cubic yards of compost.

There are two choices for purchasing our compost. First, we can drive down to Lowes Home Improvement Center who sells manure in 1 cubic ft bags for \$1.68. To determine the cost of this we will use the following calculation: \$1.68/1 ~~ft³~~ x 85 ~~ft³~~ the ft³ cancel out and you are left with \$1.68 x 85 = \$142.80. Our second option is to purchase compost from the Salt Lake Valley Landfill ("SLVL"). SLVL sells aged compost for \$30.00 for each 3 cubic yard scoop (they scoop it with their machine and drop it into the bed of your truck). To determine the cost we will use the following calculation. 3.15 cubic yard/3 cubic yard(scoop) = 1.05 scoops (containing 3 cubic ft per scoop). We can only purchase full scoops, so we will round up to 2 scoops and determine the cost as follows: \$30/1 ~~scoop~~ x 2 ~~scoops~~/1 = \$60. In deciding which compost choice to choose, let us **determine the absolute and the relative difference** of our choices. In determining the absolute value we will use the following calculation: 142.80 - 60 = \$82.80. The relative difference may be determined as follows: \$82.80/60=1.38 or 138%. The compost at Lowes costs \$82.80 more, or 138% more than the compost at SLVL. We will be getting our compost from SLVL. Below is a chart showing the cost comparison of our two possible compost sources.



Potato Towers – Some More Dirt

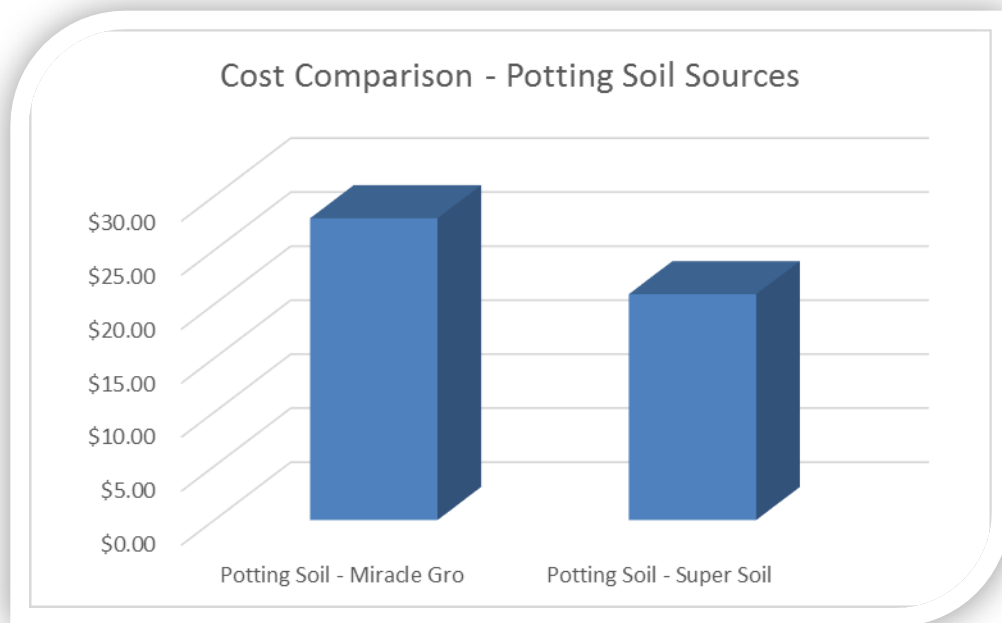
I decided to add four potato towers to my garden this year, as an experiment in growing potatoes vertically. A potato tower is basically a wire mesh cylinder with a 4 ft circumference, lined with straw (to hold in the potting soil) and filled with potting soil. Soil is actually added to the wire cylinder as the potatoes grow until the plant reaches the top of the cylinder. As the stems of the plant are covered with soil they will turn into roots. Potatoes are a tuber and will sprout spuds along the length of the roots. The idea is that at the end of the growing season the wire cage will be opened up and a pile of potatoes and dirt will tumble out.

In order to determine how much potting soil will be required to purchase for this experiment, we will need to **determine the volume of this straw lined cylinder**. The formula for determining the volume is $V=h\pi r^2$ (volume=height x pie x radius squared). In order to use this formula we will first need to know **the radius of the circle**. The radius is determined using the following formula: $r=C/2\pi$ (radius = circumference divided by 2 x pie). My calculations are as follows: $r=4ft/(2\pi)$; $r=4ft/6.283185307$; radius = .637 feet. Now we can plug the radius into the volume formula ($V=h\pi r^2$) as follows: $4ft \times \pi \times .637^2$; $4ft \times \pi \times .406 = 1.3$ cubic feet. We will need 1.3 cubic feet of potting soil per column. We will need a total of 5.2 cubic ft (1.3 cubic ft x 4 = 5.2 cubic ft) for all of our towers.

Lowes sells two kinds of potting soil. A store brand, SuperSoil, comes in a 2 cubic ft bag for \$6.97 a bag. In determining the number of bags, as well as cost for the same, we will use the

following calculations: $\frac{5.2 \text{ ft}^3}{2.5 \text{ ft}^3} = 2.08$ bags. We can't purchase a portion of a bag, so we will round up. 3 bags x \$6.97 each bag = \$20.91 for the SuperSoil. The second brand of potting soil Lowes sells is the national brand Miracle Gro, which comes in a 2.5 cubic foot bag for \$13.97 a bag. In determining the bags, as well as cost for the same, we will use the following calculations:

$\frac{5.2 \text{ ft}^3}{2.5 \text{ ft}^3} = 2.08$ bags. Two bags x \$13.97 = \$27.94 for the Miracle Gro. In deciding which potting soil choice to choose, let us once again **determine the absolute and the relative difference** of our choices. In determining the absolute value we will use the following calculation: \$27.94 - \$20.91 = \$7.03. In determining the relative value we will use the following calculation: $\frac{7.03}{20.91} = .34$ or 34%. Miracle Gro cost 34% more than the store brand, or \$7.03 more. We will be choosing the SuperSoil option. Below is a chart showing the cost comparison of our two possible potting soil sources.



Below is a table showing the total cost of the soil and soil additives for my garden.

Soil and Soil Additives			
Item	Cost	How many are needed?	Total Cost
3 cubic yard scoop of compost	\$ 30.00	2	\$ 60.00
Potting Soil, Super Soil store brand	\$ 6.97	3	\$ 20.91
Total Soil Cost:			\$ 80.91

Plants and Seeds

Now that we know how much area we have to plant, we will move on to determining how many plants and seeds will be needed for the garden. I have learned that it is important to grow those vegetables your family will eat. In planning my garden I chose to plant the following family favorites: spinach, peas, carrots, lettuce, green beans, cucumbers, dill weed (for pickling those cucumbers), onions, bell peppers, Anaheim peppers, spaghetti squash, yellow zucchini, jet star and better boy tomatoes, cherry tomatoes, watermelon, cantaloupe and potatoes. There are calculations which need to be made for each plant including the optimal space needed for each plant, whether we will direct sow (seed in the ground) or greenhouse start (plants will be grown from seed in my dad's greenhouse and planted in the garden later) and the number of each plants or seeds which will be needed for each row. In determining this, we will also need to take into account whether the crops will be supported by a trellis as experience has taught me that more plants can be planted when growing vertically versus growing traditionally on flat ground.

The following calculations were made in determining the plant and seed needs for the garden:

Regular tomatoes: I want to plant two 2 ft x 20 ft rows of tomatoes. The plants need 24 inches (2 ft) of space between each plant. How many tomato plants can I plant in each 20 ft row? $20\text{ ft}/2\text{ ft} = 10$ plants per row. However, if I stake the plants (tie them to a tall wooden stake as they grow) instead of cage them (traditional introverted wire cone), I can plant them double wide the entire length of the row. How many plants will I need with this method? 2×10 plants x 2 rows = 40 plants.

Cherry tomatoes: I want to plant one 2 ft x 10 ft row with cherry tomatoes. They will be grown vertically on a trellis (tied to trellis as they grow). If the plants need 24 inches (2 ft) of space between each plant, how many cherry tomato plants can are needed? $10\text{ ft}/2\text{ ft} = 5$ plants. Because I am growing the cherry tomatoes on a trellis, this row can be planted with another crop on the opposite side of the row.

Cucumbers: If I grow one 2 ft x 10 ft row with cucumbers (on a trellis opposite the cherry tomatoes on the same row) they will need 1 ft of space. [Note: bush cucumbers (non-trellised) require 3 ft hills for each space.] How many cucumber plants can I grow on the other side of this 10 ft row? $10\text{ ft}/1\text{ ft} = 10$ plants.

Sugar Baby watermelon: I want to grow sugar baby watermelon plants on a trellis in a 2 ft x 10 ft row. Because I am growing them on a trellis I can space them 18 inches (1.5 ft) apart. [Note:

traditional planting requires a 3 ft hill for each plant] How many plants can I grow? $10 \text{ ft} / 1.5 \text{ ft} = 6.6$ plants. We will plan on 7 plants.

Spaghetti squash: I want to plant one 2 ft x 10 ft row with spaghetti squash (opposite the sugar baby watermelon on the same row) Because I am growing them on a trellis I can space them 18 inches (1.5 ft) apart. [Note: traditional planting requires a 3 ft hill for each plant] How many plants can I grow? $10 \text{ ft} / 1.5 \text{ ft} = 6.6$ plants. We will plan on 7 plants.

Sweet bell peppers: I want to plant one 2 ft x 20 ft row with green peppers. The plants need 18 inches (1.5 ft) spacing for optimal growth. How many peppers can I grow? $20 \text{ ft} / 1.5 \text{ ft} = 13.33$ plants. We will plan on 13 plants.

Anaheim peppers: If I stagger the plants in a 2 ft 20 foot row I can double the green pepper plants up in the same row as my favorite Anaheim peppers. The Anaheims take just as much space to grow as the green peppers (18 inches or 1.5 ft). How many Anaheim pepper plants can I grow? $\frac{20 \text{ ft}}{1.5 \text{ ft}} = 13.33$ plants. We will plan on 13 plants.

Evergreen white bunching onion: Onions planted in a traditional row require approximately 4 inches of spacing. In a 2 ft wide raised bed, they can be planted 3 deep (wide). How many onions can I grown in a 2 ft x 10 ft row? $\frac{4 \text{ inch}}{1} \times \frac{1 \text{ ft}}{12 \text{ inch}} = .35 \text{ ft}$. $\frac{10 \text{ ft}}{.35 \text{ ft}} = 28$; $28 \times 3 \text{ wide} = 86$ plants.

Cantaloupe: Cantaloupe planted in a dirt raised bed and trellised can be planted 12 inches (1 ft) apart. How many cantaloupe plants can fit in a double trellised 2 ft x 10 ft row? $\frac{10 \text{ ft}}{1 \text{ ft}} = 10$ plants; $10 \text{ plants} \times 2 = 20$ cantaloupe plants.

Peas: Peas must be planted from seed because of their delicate root system. They need 2 inches of space between each pea. If I trellis my peas on one side of a 2 ft x 20 ft row, how many seeds are needed? $\frac{2 \text{ inch}}{1} \times \frac{1 \text{ ft}}{12 \text{ inch}} = \frac{2 \text{ ft}}{12} = .16 \text{ ft}$; $\frac{20 \text{ ft}}{.16 \text{ ft}} = 125 \text{ seeds}$. If we plant 2 seeds in each of the 2 inch spaced pea holes, how many seeds will you need? $125 \text{ seeds} \times 2 = 250$ seeds.

Lettuce and Spinach: On the same 2 ft x 20 ft row as the trellised peas, we will plant 10 ft of spinach and 10 ft of lettuce. An average of 15 seeds is needed for each foot planted as the seeds are tiny and the birds enjoy them (Wanberg). How many spinach seeds and how many lettuce seeds are needed for their 10 foot long space? $\frac{15 \text{ seeds}}{1 \text{ ft}} \times 10 \text{ ft} = 150 \text{ seeds}$ each 10 ft space. 150 lettuce seeds. 150 spinach seeds.

Green beans: Green beans traditionally need 6 inches of spacing, but if we trellis them, we can plant them 3 inches apart. How many bean seeds are needed to sow one side of a 2 ft x 20 ft trellised row if 2 seeds are placed in each 3 inch spaced hole?

$$\frac{3 \text{ inch}}{1} \times \frac{1 \text{ ft}}{12 \text{ inch}} = \frac{3 \text{ ft}}{12} = .25 \text{ ft per 2 seeds}; \frac{20 \text{ ft}}{.25 \text{ ft}} = 80 \text{ seeds}; 80 \text{ seeds} \times 2 = 160 \text{ seeds}.$$

Carrots: On the same 2 ft x 20 ft row as the trellised green beans (but on the opposite side of the row) we will also be planting 20 ft of carrots. Carrots should be spaced 2 inches apart. How many carrot seeds are needed to plant a 20 ft row if 3 seeds are sown in each 2 inch spaced hole?

$$\frac{2 \text{ inch}}{1} \times \frac{1 \text{ ft}}{12 \text{ inch}} = \frac{2 \text{ ft}}{12} = .16 \text{ ft}; \frac{20 \text{ ft}}{.16 \text{ ft}} = 125 \text{ seeds} \times 3 = 375 \text{ seeds}.$$

Potatoes: We will be planting three 2 ft x 10 ft rows with seed potatoes. Seed potatoes should be planted 6 inches apart and 2 wide per row. How many seed potatoes are needed to plant all three 2 ft x 10 ft row?

$$\frac{6 \text{ inch}}{1} \times \frac{1 \text{ ft}}{12 \text{ inch}} = .5 \text{ ft}; \frac{10 \text{ ft}}{.5 \text{ ft}} = 20 \text{ seed potatoes}; 20 \text{ seed potatoes} \times 2 \text{ wide} \times 3 \text{ rows} =$$

120 seed potatoes.

Dill and Zucchini: In our last 2 ft x 10 ft row we will be planting ½ of the row (5 ft) with yellow summer squash (zucchini) and the other half of the row (5 ft) with dill weed. The dill weed need 4 inches between each plant. We will be planting them 2 plants wide. How many dill plants are needed for the 5ft x 2 ft space?

$$\frac{4 \text{ inch}}{1} \times \frac{1 \text{ ft}}{12 \text{ inch}} = \frac{4 \text{ ft}}{12} = .33 \text{ ft}; \frac{5 \text{ ft}}{.33 \text{ ft}} = 15 \text{ plants}; 15 \text{ plants} \times 2 = 30 \text{ plants}$$

According to Jerry Wanberg, Master Gardner, in my personal interview with him on July 12, 2014, fresh seeds (those printed with the current season year) will typically only germinate at a 33% rate. This means that 1 in 3 seeds will grow into a plant. When Jerry plans his seed orders based on the number of plants he needs for the large greenhouse he manages, he will order three seeds of each variety for every plant he needs. This is a 3:1 ratio. To determine the number of plants your seed packets will yield, divide the number of seeds by 3. The chart below shows the cost of seed packets for the fruits and vegetables we will be planting, the number of seeds in each packet and the number of plants each seed packet will yield. Based on these calculations, the seeds needed for this garden will be \$102. 59.

In connection with the use of this H-frame trellis, we will also be using 42 inch x 84 inch metal remesh to support the weight of the climbing vines. How many sheets of wire mesh will we need for each double sided H frame? Note that each frame is 10 ft long. $\frac{84\text{-inch}}{1} \times \frac{1\text{ ft}}{12\text{ inch}} = \frac{84\text{ ft}}{12} =$

$7\text{ ft}; \frac{10\text{ft}}{7\text{ft}} = 1.42\text{ sheets.}$

We cannot purchase a portion of a sheet of wire remesh so we will round up to 2 sheets per side. 2 sheets x 2 sides = 4 sheets per H frame. We will be making 3 H frames and so will need a total of 12 sheets of metal remesh. Below is a chart showing the cost breakdown of the parts needed for the H-frame trellis.

Materials needed for 10 ft H support frames					
	Cost	How many are needed per frame?	Cost per frame	Number of finished frames needed	Total Cost
PVC Pipe, 10 ft 1" diameter	\$ 3.33	6	\$ 19.98	3	\$ 59.94
T connectors	\$ 0.35	12	\$ 4.20	3	\$ 12.60
Metal conduit pipe, 10 ft 1/2" diameter	\$ 2.49	2	\$ 4.98	3	\$ 14.94
Metal conduit pipe, 5 ft 1/2" diameter	\$ 1.98	6	\$ 11.88	3	\$ 35.64
PVC glue cement stuff	\$ 4.50	1	\$ 4.50	3	\$ 13.50
Wire Re-Mesh (to support plants)	\$ 7.98	4	\$ 31.92	3	\$ 95.76
Total cost of H support frames:					\$ 232.38

The second trellis design is used as a support for the peas and bean plants to climb up. The structure of the frame is created using four 5 ft lengths of 1 inch pvc pipe with a T connector on the top of the frame. Three 5 ft lengths of the 1/2 inch metal conduit are secured to the ground at regular intervals along the side of the 20 ft row. The 1 inch pvc pipe is threaded over the staked metal conduit line. Two 10 ft 1/2 inch metal conduit pipes are threaded through the T connectors on the top of the pvc lines. The polyester trellis netting is threaded onto the metal conduit pipe as it is guided through the top T connectors and then secured to the ground using garden staples. If we add the cost of the parts needed (see below) by the total number of pea/bean frames needed (2) then the cost of the pea and bean support frames is \$67.68.

Materials needed for 20 foot pea/bean frames					
Item	Cost	How many are needed per frame?	Cost per frame	Number of finished frames needed	Total Cost
PVC Pipe, 10 ft - 1" diameter	\$ 3.33	2	\$ 6.66	2	\$ 13.32
T connectors	\$ 0.35	4	\$ 1.40	2	\$ 2.80
Metal conduit pipe, 10 ft 1/2" diameter	\$ 2.49	2	\$ 4.98	2	\$ 9.96
Metal conduit pipe, 5 ft 1/2" diameter	\$ 1.98	4	\$ 7.92	2	\$ 15.84
Polyester trellis netting (5ftx30ft)	\$ 12.88	1	\$ 12.88	2	\$ 25.76
Total cost of pea/bean frames					\$ 67.68

Stakes: The ability to plant twice as many tomatoes per row by staking the tomatoes instead of using the traditional wire cage for support is enticing to me. After all, we will be “successful with almost any tomato variety if you offer it support” (Full at pg. 20). Lowes sells a 6 pack of 60inch wooden landscape stakes for \$7.98 a pack. We need 1 stake for each of the 40 regular tomato plants we are growing. How many 6 packs of the wooden stakes will we need? $\frac{40 \text{ stakes}}{6 \text{ stakes pkt}} = 6.66 \text{ pkts}$; We will round this up to 7 pkts. $7 \text{ pkts} \times 7.98 = \55.86 . We can grow 40 tomato plants at a cost of \$55.86 for the support. Approximately how much does each stake cost per tomato plant? $\frac{\$55.86}{40 \text{ tomato plants}} = 1.3965$ or \$1.40 per tomato plant. Compare this to the cost of a traditional wire cage support. Lowes sells a 56 inch wire tomato cage for \$4.48. A separate cage is needed for each tomato plant. What is the absolute and relative difference in cost between the wooden stake and the wire cage? Absolute difference = $\$4.48 - \$1.40 = \$3.08$. Relative difference = $\frac{\$3.08}{\$1.40} = 2.2$ or 220%. The wire cage costs \$3.08 more than the wooden stake or 220% more. We will choose the wooden stake.

Soaker Hose: Improper watering is one of the most common gardening mistakes (Gilbertie & Sheehan 91). I have tried several different types of watering in the past and have found the best results with using soaker hose to deliver water to my plants. Sal Gilbertie also recommends that the garden be watered at soil level. This will keep plants dry and free of fungus problems (95). Accordingly, we will be using soaker hose to water our dirt raised beds by lining both sides of the rows with a line of hose. If we have five 2 ft x 20 ft rows and seven 2 ft x 10 ft rows, how many 50 ft spools of soaker hose will we need? $5 \times 20 \text{ft} \times 2 = 200 \text{ ft}$ of soaker hose for the 20 ft rows; $\frac{200 \text{ ft}}{50 \text{ ft}} = 4 \text{ spools for the 20 ft rows}$; $7 \times 10 \text{ft} \times 2 = 140 \text{ feet}$ of soaker hose for the 10 ft rows; $\frac{140 \text{ ft}}{50 \text{ ft}} = 2.8 \text{ spools or 3 spools for the 10 ft rows}$; $3 \text{ spools} + 4 \text{ spools} = 7 \text{ spools}$. If each spool of soaker hose costs \$12.98, how much will we spend on the 7 spools of soaker hose? $\$12.98 \times 7 = \90.86 . Please note that only 100 ft of soaker hose should be connected and be running at a single time for optimal water use (Wanberg). For each 200 ft of soaker hose we will be using a Y connector to assure we only have water running in 100 ft of hose at one time. How many Y connectors will we need for this garden? $\frac{200+140}{200} = \frac{340}{200} = 1.7 \text{ connectors}$. We will purchase 2 Y connectors. If Y connectors cost \$3.98 each, how much will we spend on Y connectors for the garden? $\$3.98 \times 2 = \7.96 .

Below is a table showing the cost breakdown of the remaining non-trellis support materials.

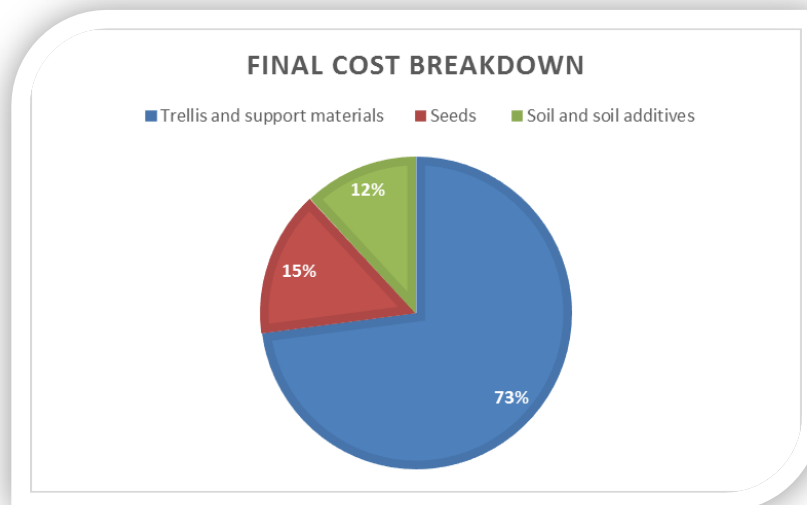
Additional support items			
Item	Cost	How many are needed	
Soaker Hose, 50 ft	\$ 12.98	7	\$ 90.86
Y Connectors	\$ 3.98	2	\$ 7.96
6 pk of 60" wooden landscape stakes	\$ 7.98	7	\$ 55.86
Wire Mesh (for potato towers)	\$ 34.77	1	\$ 34.77
Straw (for potato towers)	\$ 5.00	1	\$ 5.00
Total cost additional support items:			\$ 194.45

Final Costs:

Finally, let's take a look at the final monetary cost of the creation and implementation of the three main areas for my vertical garden space. The table below shows the cost breakdown of each area with a total cost of \$678.01.

Final Costs	
Trellis and support materials	\$494.51
Seeds	\$ 102.59
Soil and soil additives	\$ 80.91
Total Cost	\$678.01

Additionally, the pie chart below shows a very dramatic difference in the cost of creating the trellis and other support materials for the garden versus the seeds and soil/soil additives.



It is fortunate that I was able to save some money in different areas of the garden by doing a cost comparison analysis of different materials used for the same. That fact aside, if I did not gain

a significant amount of satisfaction from growing the plants in my garden, I can see how the cost of gardening can be quite staggering. There is no such thing as a free garden (Gilberte 30). However, while I would never spend \$678.01 on vegetables at the store, and would laugh at anyone who did, I would not hesitate to spend this same amount on a garden. There is an intrinsic value I place on gardening which makes the final cost of the same quite agreeable.

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