

Vegetable Gardening for the Community!

Description:

Explore the world of gardening through owning a Community Supported Agriculture (CSA) operation! Students will explore economics as it relates to owning and operating a program through a simulation.

Background:

Community Supported Agriculture (CSA) is a program where consumers pay for a "part or share" of the farm. Each farm has their own share system based on what they grow and the seasons in which they have fresh produce to distribute. Each person holding a share receives a portion of the farm's crop yield. CSA farms are growing in popularity as people want fresh produce to feed their families. In 2015, to the United States Department of Agriculture estimated that 7,398 farms sold products through a community supported agriculture program directly to consumers. CSA farms were first developed to provide produce to people that don't have access to gardens to grow food and to meet a growing demand for food grown on small acreage farms.

Directions:

Introduction to Garden and Community Supported Agriculture

1. Explain to students that there are many considerations that must be made in order to grow a garden. Today, we are going to explore some of those concepts through a book about gardening.

2. Read the book, *Up in the Garden, Down in the Dirt* by Kate Messner

3. Review the following questions with students after reading the book:

- What kinds of creatures lived in the garden in the story?
- How do the creatures in the garden affect the plants growing there?
- What are some of the benefits of having living organisms in the garden?
- What are some of the consequences of having living organisms in the garden?

4. Introduce students to the concept of Community Supported Agriculture (CSA).

Explain to students that Community Supported Agriculture is a program where members pay a farmer to have a box of fresh produce delivered or available for pickup on a regular basis.

CSA farms were first developed to provide produce to people that don't have access to gardens to grow food and to meet a growing demand for food grown on small acreage farms. We are going to watch this short video about CSA farms in Oregon.

5. Watch Oregon Department of Agriculture's Community Supported Agriculture video (<https://youtu.be/Rf2OBxcqHwg>).

Activity 1: Map your CSA!

1. Provide students with the following scenario before they begin the activity.

Today, you are going to take on the role of the owner of a local CSA with 10 acres to grow potatoes, lettuce, radish, spinach and broccoli. You will be selling Winter Shares for \$24 per box of vegetables delivered on a weekly basis to local families. As an owner you will create a name for your farm and decide how much of each vegetable to plant.

2. Provide students with a copy of the *Garden Mapping Diagram* and a set of colored pencils.

3. Instruct students to create a name for their CSA operation and list it in the space provided.

4. Then, instruct students to determine the amount of each crop listed on their worksheet to grow on their 10 acre farm, record each of the amounts in the chart provided. Students

Grade Level: 3-5

Essential Skills: 1, 2, 3, 5

CCSS: 3.RF.4, 3.W.10, 3.SL.1, 3.SL.3, 4.RF.4, 4.W.10, 4.SL.1, 5.RF.4, 5.W.10, 5.SL.1

Math: 3.MP.1, 3.OA.1, 3.OA.3, 3.NBT.2, 4.MP.1, 4.OA.2, 4.NBT.4, 5.MP.1, 5.NBT.5

Time: 60 minutes

Materials:

Up in the Garden, Down in the Dirt book, by Kate Messner

Per student

- *Garden Mapping Diagram* worksheet*
- Colored pencils
- 1 Dice
- *Vegetable Information* card
- *Garden Yield Projections* worksheet*
- *Unexpected Variables* cards*
- *Garden Income & Expenses* worksheet*
- Calculator(optional)

***Materials Available from Oregon Agriculture in the Classroom.**

Lesson adapted from:



AITC Library Resources:

Books:

Our School Garden by Rick Swann

The Garden Classroom by Cathy James

More Lessons:

Garden in a Glove
Seed, Soil, Sun & See them Sprout
Growing Bracelets
Turf Buddies

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must grow at least one acre of each crop to provide a diverse offering of vegetables for their customers.

5. Using the map legend, students will shade in the grid based on where they would plant each crop on their farm with the corresponding color from the chart. Ten squares equals one acre. *For example, if you grow 2 acres of potatoes, you would shade 20 squares brown.*

Activity 2: Garden Yield Projections

1. Provide each student with a *Garden Yield Projections* worksheet.
2. Instruct students to fill in the acres column with the amounts they decided to grow of each crop from the *Garden Mapping Diagram*.
3. Then, have them calculate the projected yield by multiplying the acres by the yield/acre to determine the amount the garden will produce.

Activity 3: Determining profitability

1. Explain to students that farmers plant based on projections of expenses and income among other important considerations but there are a lot of uncontrollable expenses that affect their profit that are difficult to predict. In this activity, you will explore some of the unpredictable factors that could occur.
2. Provide students with a set of *Unexpected Variable* cards, a *Garden Income & Expenses* worksheet and one die.
3. Have students begin by filling in the acre column on their worksheet with the number of acres they have "planted" of each crop based on their *Garden Mapping Diagram*.
4. After, they will pick up one of the *Unexpected Variable* card to begin. They will read through the information on the card, then roll their die.
5. The number they roll will determine how their crop fared in the season. They will then fill in the yield or expense column accordingly.
6. Have students repeat this process for all of their crops and *Unexpected Variable* cards.
7. After determining the unexpected variables, students will fill in any remaining empty boxes with the projected numbers provided on the *Vegetable Information* card.
8. Then, have students go through line by line and calculate their total yield based on the numbers they recorded.
9. After, have students find the sum of their expenses and list it in the subtotal expenses box.
10. Have students complete the three questions at the bottom of their worksheet to determine how many boxes they will be able to distribute and whether their farm was profitable.
11. Review the following questions as a class:
 - a. What made your farm successful or unsuccessful?
 - b. What would you do differently?



Activity Page

Garden Mapping Diagram

Farm Name: _____

Year: _____

Directions: Before you start mapping out your garden, create a name for your CSA operation and list it above. Next, you will decide how much of each crop listed on the bottom of this worksheet to grow on your 10 acre farm and record the amount in the chart provided. You must grow at least one acre of each crop. Using the map legend you will shade in the grid based on where you would plant each crop on your farm. **10 shaded squares equals one acre.** For example, if you grow 2 acres of potatoes, you would shade 20 squares brown.

Map Legend (10 Squares = 1 acre)

Crop	Potatoes	Lettuce	Spinach	Radish	Broccoli
Acres					



Activity Page

Garden Yield Projections

Directions: Fill in the acres column with the amounts you decided to grow of each crop from the *Garden Mapping Diagram*. Then, complete the equations as listed by multiplying the acres by the yield/acre to determine the projected yield or anticipated amount grown.

Crop	Acres	Yield/acre	Projected Yield
Potatoes		450 cwt	=
Lettuce		900 cartons	=
Spinach		750 cartons	=
Radish		700 cartons	=
Broccoli		5 tons	=





Unknown Variables Cards

Potatoes

Roll a dice, to determine which variable has affected your crop. On the *Garden Income & Expenses* worksheet, fill in the boxes and complete the equation based on the variable you roll from below. *For example, if you roll a two you will write 40,500 lbs. in the yield/acre column.*

- 1) The presence of late blight, a fungal disease causing black lesions caused you to loose 50% of your crop yield, your yield decreased to 22,500 lbs. per acre.
- 2) An infestation of wire worms have burrowed in your potatoes, yield decreased by 10%, your yield decreased to 40,500 lbs. per acre.
- 3) Absolutely perfect weather conditions resulted in a bumper crop. Your yield increased to 55,000 lbs. per acre.
- 4) The Cost of Fertilizer decreased by \$20 per acre, decreasing your total cost to \$6,180 per acre.
- 5) The Cost of Fertilizer increased by \$20 per acre, increasing your total cost to \$6,220 per acre.
- 6) Flood waters drown out your crop – Yield decreased to 40,000 lbs. per acre.

Unknown Variables Cards

Lettuce

Roll a dice, to determine which variable has affected your crop. On the *Garden Income & Expenses* worksheet, fill in the boxes and complete the equation based on the variable you roll from below. *For example, if you roll a 6 you will write 1,080 cartons in the yield/acre column.*

- 1) You take pride in your soil health and work to ensure the plants have an adequate supply of nutrients. Increase your yield to 905 cartons/acre.
- 2) Lettuce requires 10-12" of irrigation per acre, your irrigation system failed to reach the plants on the edge of your lettuce plot, your yield decreased by 5% to 855 cartons per acre.
- 3) Storage refrigeration quit causing the temperature to raise to above 75 F, you lost 10% of your yield, your yield decreased to 810 cartons.
- 4) Additional treatments required to prevent Powdery Mildew and to eliminate aphids – Cost per acre is now \$5,330.
- 5) Perceived Ecoli scare – Only able to sell 50% of your normal yield, leaving you with 450 cartons or about 10,800 heads of lettuce per acre.
- 6) Perfect weather conditions – 20% increase in yield making your new yield 1,080 cartons, about 25,920 heads of lettuce!



Unknown Variables Cards

Spinach

Roll a dice, to determine which variable has affected your crop. On the *Garden Income & Expenses* worksheet, fill in the boxes and complete the equation based on the variable you roll from below. *For example, if you roll a 4 you will write \$5,510 in the expense column.*

- 1) Sunny weather at all the right times. Yield increases to 800 cartons per acre.
- 2) Cool, cloudy weather and slugs are everywhere! Your yield is decreased by 10% to 675 cartons per acre.
- 3) Leaf miners are present in your garden that like to eat the leaves of plants, luckily they are more attracted to the radishes you planted and have no impact to the radish since it grows underground. Your spinach yield is not affected and remains at 750 cartons per acre.
- 4) The cost of fertilizer spikes when you need to top-dress. Increase your cost by \$10 per acre for a new total cost of \$5,510 per acre.
- 5) Neighboring wildlife decide to snack on your spinach, your yield decreases by 20% for a yield of 600 cartons/acre.
- 6) You take pride in your soil health and work to ensure the plants have an adequate supply of nutrients. Increased your yield to 755 cartons/acre.

Unknown Variables Cards

Radish

Roll a dice, to determine which variable has affected your crop. On the *Garden Income & Expenses* worksheet, fill in the boxes and complete the equation based on the variable you roll from below. *For example, if you roll a 1 you will write 750 cartons in the yield/acre column.*

- 1) Bumper crop- your yield increases to 750 cartons per acre.
- 2) You have had a previous history of root maggots chewing on your radish, as a preventative measure you cover the plants (including cover, insect netting, and hoops), your cost increases to \$5,900 per acre.
- 3) Vole (field mice) outbreak – It costs you \$20 per acre more for all the mouse bait and labor making your new cost \$5,500 per acres.
- 4) Yield is dependent upon soil quality. You have POOR soil quality. Use 650 cartons/acre as your yield.
- 5) Yield is dependent upon the Soil Quality. You have GREAT soil quality. Rather than 700 cartons/acre, you get 750 cartons/acre.
- 6) Landowner raises the rent by \$30 per acre, making your new total cost \$5,330 per acre.

Unknown Variables Cards

Broccoli



Roll a dice, to determine which variable has affected your crop. On the *Garden Income & Expenses* worksheet, fill in the boxes and complete the equation based on the variable you roll from below. *For example, if you roll a 3 you will write 4.5 tons in the yield/acre column and \$2,120 in the expenses column.*

- 1) You have high quality soil, increase your yield to 6 tons per acre.
- 2) Bumper crop. Yield increases to 6.5 tons per acre.
- 3) The cabbage looper is out biting into your broccoli heads, reducing your yield to 4.5 tons per acre. You even tried applying a second insecticide spray which costs an additional \$20 per acre, making your total cost, \$2,120 per acre. (Make sure to adjust both cost and yield).
- 4) Typically germination of broccoli seed is 75%. You get a bad lot of seed, the germination is only 65%. This causes a 10% decrease in your yield making your new yield 4.5 tons per acre.
- 5) Liquid fertilizer prices increased 12%. Your cost per acre went up to \$2,172.80.
- 6) You have damping-off due to drainage problems in the area you planted your broccoli seeds, causing the seedlings to die, your yield went down to 3 tons per acre.



Vegetable Information Card

Projections



Roll a dice, to determine which variable has affected your crop. On the *Garden Income & Expenses* worksheet, fill in the boxes and complete the equation based on the variable you roll from below. *For example, if you roll a 3 you will write 4.5 tons in the yield/acre column and \$2,120 in the expenses column.*

- 1) You have high quality soil, increase your yield to 6 tons per acre.
- 2) Bumper crop. Yield increases to 6.5 tons per acre.
- 3) The cabbage looper is out biting into your broccoli heads, reducing your yield to 4.5 tons per acre. You even tried applying a second insecticide spray which costs an additional \$20 per acre, making your total cost, \$2,120 per acre. (Make sure to adjust both cost and yield).
- 4) Typically germination of broccoli seed is 75%. You get a bad lot of seed, the germination is only 65%. This causes a 10% decrease in your yield making your new yield 4.5 tons per acre.
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Potatoes

Projected Yield is 45,000 lbs per acre.

Approximately 3 medium potatoes = 1 lb.

The projected cost per acre is \$6,200

Portion for box: 10 lbs.



Lettuce

Projected Yield is 900 cartons or about 21,660 heads of lettuce per acre.

1 carton = 24 heads of lettuce

The projected cost per acre is \$5,200.

Portion for box: 1 head of lettuce



Spinach

Projected Yield is 750 cartons or 18,000 bundles of spinach per acre.

1 carton = 24 bundles of spinach

The projected cost per acre is \$5,500.

Portion for box: 1 bundle of spinach



Radish

Projected Yield is 700 cartons or 33,600 bundles of radish per acre.

1 carton = 48 bundles of radishes

The projected cost per acre is \$5,300

Portion for box: 1 bundle of radishes



Broccoli

Projected Yield is 5 tons of broccoli per acre.

1 ton = approximately 1,500 head of broccoli

The projected cost per acre is \$2,100.

Portion for box: 2 head of broccoli



Activity Page

Garden Income & Expenses

Directions: Fill in the acres column with the number of acres you planted of each crop according to your *Garden Mapping Diagram*. Then, choose one *Unexpected Variable* card to begin. Read through the card, roll a dice to determine how your crop turned out for the season according to the number you rolled. Record the information in the chart below based on your roll. After you have done this for each crop, fill in the remaining empty boxes with the projected amounts listed on the *Vegetable Information* card. Then, complete the calculations in the chart and answer the questions below.

Crop	Acres	Yield/acre	Total Yield	Expenses	Acres	Total Expenses
Potatoes	X	=		X		=
Lettuce	X	=		X		=
Spinach	X	=		X		=
Radish	X	=		X		=
Broccoli	X	=		X		=

Subtotal Expenses

(Find the sum of all the expenses)

1. Which vegetable do you have the least amount of? List the total amount of that vegetable you have, this will be how many boxes you can create using the portion numbers provided on the *Vegetable Information* card. (Make sure to convert the yield from cartons or pounds to how many total it will create.)

2. Calculate the total revenue you will receive from the boxes you distribute. (Use the number of boxes calculated in problem 1, multiplied by \$24 the price your selling each box).

3. Compare your total expenses with your total revenue. Did you make a profit?

Activity Page



Garden Mapping Diagram

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Farm Name: _____

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Map Legend (10 Squares = 1 acre)									
Crop	Potatoes	Lettuce	Spinach	Radish	Broccoli				
Acres									

Vegetable Information Card

Projections



Potatoes

Projected Yield is 45,000 lbs per acre.

Approximately 3 medium potatoes = 1 lb.

The projected cost per acre is \$6,200.

Portion for box: 10 lbs.



Lettuce

Projected Yield is 45,000 lbs per acre.

1 carton = 24 heads of lettuce

The projected cost per acre is \$5,200.

Portion for box: 1 head of lettuce



Spinach

Projected Yield is 18,000 bundles of spinach per acre.

1 carton = 24 bundles of spinach

The projected cost per acre is \$5,500.

Portion for box: 1 bundle of spinach



Radish

Projected Yield is 33,600 bundles of radish per acre.

1 carton = 48 bundles of radishes

The projected cost per acre is \$5,300.

Portion for box: 1 bundle of radishes



Broccoli

Projected Yield is 5 tons of broccoli per acre.

1 ton = approximately 1,500 head of broccoli

The projected cost per acre is \$2,100.

Portion for box: 2 head of broccoli



Lettuce



Broccoli

Roll a dice, to determine which variable has affected your crop.

- 1) You take pride in your soil health and work to ensure the plants have an adequate supply of nutrients. Increase your yield to 905 cartons/acre.
- 2) Lettuce requires 10-12" of irrigation per acre, your irrigation system failed to reach the plants on the edge of your lettuce plot, your yield decreased by 5% to 855 cartons per acre.
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- 6) Perfect weather conditions – 20% increase in yield making your new yield 1,080 cartons, about 25,920 heads.

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- 4) Typically germination of broccoli seed is 75%. You get a bad lot of seed, the germination is only 65%. This causes a 10% decrease in your yield making your new yield 4.5 tons per acre.
- 5) Liquid fertilizer prices increased 12%. Your cost per acre went up to \$2,172.80.

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7) You have had a previous history of root maggots chewing on your radish, as a preventative measure you cover the plants (including cover, insect netting, and hoops), your cost increases to \$5,900 per acre.

8) Vole (field mice) outbreak – It costs you \$20 per acre more for all the mouse bait and labor making your new cost \$5,500 per acres.

9) Yield is dependent upon soil quality. You have POOR soil quality. Use 650 cartons/acre as your yield.

10) Yield is dependent upon the Soil Quality. You have GREAT soil quality. Rather than 700 cartons/acre, you get 750 cartons/acre.

11) Landowner raises the rent by \$30 per acre, making your new total cost \$5,330 per acre.



Radish

Roll a dice, to determine which variable has affected your crop.

- 1) Bumper crop- your yield increases to 750 cartons per acre.
- 2) You have had a previous history of root maggots chewing on your radish, as a preventative measure you cover the plants (including cover, insect netting, and hoops), your cost increases to \$5,900 per acre.
- 3) Vole (field mice) outbreak – It costs you \$20 per acre more for all the mouse bait and labor making your new cost \$5,500 per acres.
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Potato

Roll a dice, to determine which variable has affected your crop.

- 1) The presence of late blight, a fungal disease causing black lesions caused you to loose 50% of your crop yield, your yield decreased to 22,500 lbs. per acre.
- 2) An infestation of wire worms have burrowed in your potatoes, yield decreased by 10%, your yield decreased to 40,500 lbs. per acre.
- 3) Absolutely perfect weather conditions resulted in a bumper crop. Your yield increased to 55,000 lbs. per acre.
- 4) The Cost of Fertilizer decreased by \$20 per acre, decreasing your total cost to \$6,180 per acre.
- 5) The Cost of Fertilizer increased by \$20 per acre, increasing your total cost to \$6,220 per acre.
- 6) Flood waters drown out your crop – Yield decreased to 40,000 lbs. per acre.



Spinach

Roll a dice, to determine which variable has affected your crop.

- 1) Sunny weather at all the right times. Yield increases to 800 cartons per acre.
- 2) Cool, cloudy weather and slugs are everywhere! Your yield is decreased by 10% to 675 cartons per acre.
- 3) Leaf miners are present in your garden that like to eat the leaves of plants, luckily they are more attracted to the radishes you planted and have no impact to the radish since it grows underground. Your spinach yield is not affected and remains at 750 cartons per acre.
- 4) The cost of fertilizer spikes when you need to top-dress. Increase your cost by \$10 per acre for a new total cost of \$5,510 per acre.
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