Sprouting Seeds to Microgreens!

Grade Level: 3-5

Essential Skills: 1, 2, 3, 4, 5, 9

CCSS: 3.RF.3, 3.RF.4, 3.W.8, 3.SL.1, 4.RF.3, 4.RF.4, 4.W.8, 4.SL.1, 5.RF.3, 5.RF.4, 5.W.8, 5.SL.1

Math: 3.GM.C, 4.GM.B, 5.NF.B

NGSS: 3.LS.1, 4.LS.1, 5.LS.1

Time: 90 minutes

Materials:
Microgreens Kit* or per student:

- *Heads Up! Plants Up!* cards
- *Microgreens Information* cards
- *Microgreens Mythbuster* worksheet
- *Mighty Microgreens* worksheet
- Microgreen seeds
- Planting Container (with hole)
- Nesting Container (without hole)* Baking Tray or 1020 Flat
- Soil
- Water

AITC Library Resources:
Books:
Seed, Soil, Sun
How a Plant Grows
From Seed to Plant
Plant Plumbing

More Lessons:
Desktop Greenhouse
Garden in a Glove
Living Necklace
Grow a Bean in a Bag

Description:
Garnish your math, literacy and science curriculum with sweet or spicy microgreens! Students will explore a tasty way to learn about life cycles and calculate area with real life application.

Activity Directions:
Activity 1: Heads Up, Plants Up!
1. Divide students into six groups. Explain to students they will be playing a quick game of *Heads up! Plants Up!*.

2. Distribute a stack of *Heads Up! Plants Up!* cards to each group.

3. Explain to students that the bottom side of the card has a secret word, the guesser in the group will hold the card up to their forehead with the word facing out for their other group members to see. Their group members are to describe the word on the card to their teammate and the guesser has to figure out the word. When the guesser says the correct word, they will set the card aside and pass the deck of cards to the next person. The group member who just received the stack of cards will draw the next card placing in face out on their forehead. Then, the other groups members will describe the new word to the new guesser. Once you have made it through the entire deck, all group members should raise their hands quietly. The first group through all the cards is the winner. If for some reason, one of the describers accidentally says the word or the card is revealed in some other way the team doesn't earn that point. You may begin!

4. After everyone has finished, have students return to their desks for a quick review of the words.
   a. What were the words on our cards? (water, air, nutrients, seeds, light and care)
   b. What do these words have in common with plants?

Activity 2: Microgreen Mythbusters
1. Explain to students that they will be learning about microgreens, a small, edible plant.

2. Divide students into groups of 3-4 students or work together as a whole class. Provide groups or display a copy of each of the *Microgreen Information* cards.

3. Distribute a copy of *Microgreens Mythbusters* worksheet to each student.

4. Explain to students that they will read through the *Microgreen Information* cards to determine whether or not the statements on the *Microgreens Mythbusters* worksheet are true or false. If the statement on the worksheet is false, students are tasked with rewriting the statement to make it true.

5. After completing the worksheet, review the following concepts as a class:
   a. What are microgreens?
   b. How are microgreens harvested?

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Activity 3: Mighty Microgreens

Teacher Preparation: fill a growing flat or tray with water to allow students to moisten the soil with.

1. Explain to students that they will be growing some microgreens of their own and will get the opportunity to taste them when they are ready to harvest.

2. Provide students with a copy of the *Mighty Microgreens* worksheet.

3. Distribute a growing container to each student. The kit provided from AITC will have a small cup with a hole in the bottom to use as the growing container.

4. Using the worksheet, students will determine the optimal seed density for growing microgreens in the provided container.

5. There are two different versions of the *Mighty Microgreens* worksheet included in this lesson. Each worksheet is labeled in the top right-hand corner based on what shape of container students will be planting in. **Make sure to select the correct one as the formulas are different for determining the area.**

6. Have students follow the steps listed on the worksheet to determine the area of the container they will be planting in.

7. Next, have students calculate the number of seeds to plant in the container based on the formula provided on the worksheet.

8. After, have students follow the steps listed in Step 3, to prepare and plant microgreens in their container.

9. Instruct the students to fill their provided container nearly full with soil.

10.Using the baking tray or 1020 flat with water you prepared, have students place their soil container on the tray to begin to wet the soil.

11. Once the soil is wet, students should remove the container from the water.

12. Instruct students to evenly distribute the number of seeds determined in the **Step 2** calculations on the *Mighty Microgreens* worksheet.

13. After all students have their soil moist, discard the remaining water and have students place their planted container in the nesting container. Provide each student with a nesting container, the second cup (without a hole) to stack on the bottom of the growing container. This will be used to add water to the soil as need through the growing period.

14. Cover the containers with the box lid provided in the kit or place in a dark area until germination has occurred. If needed add water to the nesting tray if the soil becomes too dry.

15. After seeds have germinated, place the growing plants in an area where they will be in direct light near a window.

16. As needed add water to the nesting container to maintain moisture in the soil.

17. The microgreens will take between 7-21 days to grow, during that time, have students track their growth using the worksheet to sketch their growth every 2-3 days.

18. Harvest the microgreens using a clean pair of scissors when the true leaf of the microgreens have emerged. Wash the microgreens and enjoy them as a snack in class!

References:

Sanchez, Ph.D., Elsa, and Robert Berghage, Ph.D>. "Growing Microgreens." Penn State Extension, 27 Feb. 2020, extension.psu.edu/growing-micro greens.

Gioia, Ph.D., Francesco D. "A Step-By-Step Guide for Growing Microgreens at Home." Penn State Extension, 11 May 2020, extension.psu.edu/a-step-by-step-guide-for-growing-microgreens-at-home.

Gioia, Ph.D., Francesco D. "The ABCs of Microgreens." Penn State Extension, 8 May 2020, extension.psu.edu/the-abcs-of-microgreens.

Heads Up!
Plants Up!

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Heads Up!
Plants Up!

Heads Up!
Plants Up!

Water

Air

Nutrients

Seeds

Light

Care

Microgreen Information Cards

Sprouts vs. Microgreens

Sprouts and microgreens are often thought of as the same thing. However, sprouts and microgreens are different. When eating sprouts, you are eating the seedling, radicle and the remaining parts of the seed. When eating microgreens, you are eating a single shoot with the cotyledon and true leaf present.

Sprouts

Microgreens

Microgreen Information Cards

Microgreens are nutritious!

The 2020-2025 Dietary Guidelines for Americans suggest 2 1/2 cups of vegetables per day. Studies have suggested that microgreen have more vitamins than the same plant when it's fully grown. Vegetables provide nutrients such as dietary fiber, vitamin A, vitamin C, vitamin K, vitamin E, vitamin B6, folate, thiamin, niacin, choline and more!

Microgreen Information Cards

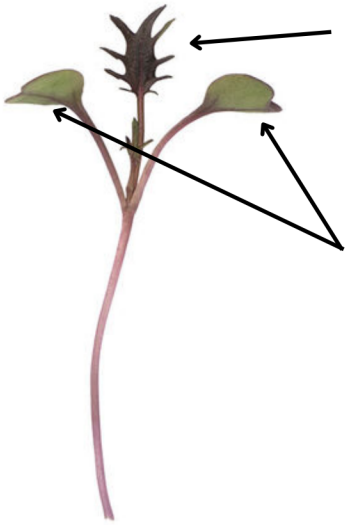
Planting Microgreens

To plant microgreens, you must first determine the amount of seed you will need. After, fill your container with soil and set in a nesting tray. Then, add water to the nesting tray and set the container with soil in it until the soil moistens. It is recommend to keep the containers in a dark area during germination. This can be done by covering the containers with something to block the light. After the seeds have sprouted, uncover the seeds and place in area with light exposure.

Microgreen Information Cards

Harvesting Microgreens

Microgreens are harvested between 7-21 days depending on the type of seed being grown. A microgreen plant will germinate and then the cotyledon leaves will fully develop. After, the true leaf will grow. This indicates it's time for harvesting the microgreens. Microgreens can be harvested using scissors or a sharp knife.



Microgreen Information Cards

Uses of Microgreens

Microgreens can be used as an afternoon snack or to garnish a meal. Microgreens range in flavor from sweet to spicy depending on the variety. Some common uses of microgreens include a taco topping and in sandwiches or salads. Next time you are in need of a healthy snack or a topping for a pizza, consider microgreens!

Microgreen Information Cards

Microgreen Varieties

Many plants can be grown as microgreens. The most common types of microgreen seed grown belong to the broccoli family. Common types of microgreens grown include: arugula, basil, mustard, cauliflower, kale, radish and much more. Using a variety of plants allows for different colors and flavors to be added to your meal or snack. Seed companies sell microgreen seeds in mixtures to create spicy, mild or sweet flavors.

Activity Page

Microgreens Mythbusters

Name: _____

Directions: Read the sentences below and determine if they are a true statement based on the information provided on the *Microgreens Information* cards. If they are false, rewrite the sentence to make the statement true.

1. Microgreens and sprouts are the same thing.

Is the statement true or false? _____

If the statement is false, rewrite the sentence to make it true.

_____

_____

2. Microgreens have less vitamins than a full-grown vegetable.

Is the statement true or false? _____

If the statement is false, rewrite the sentence to make it true.

_____

_____

3. Microgreens are harvested when the cotyledon leaves appear.

Is the statement true or false? _____

If the statement is false, rewrite the sentence to make it true.

_____

_____

4.The plant must be placed in light to germinate.

Is the statement true or false? _____

If the statement is false, rewrite the sentence to make it true.

_____

_____

5. All microgreens taste spicy.

Is the statement true or false? _____

If the statement is false, rewrite the sentence to make it true.

_____

_____

6. Microgreens are all the same color and only come from one type of seed.

Is the statement true or false? _____

If the statement is false, rewrite the sentence to make it true.

_____

_____

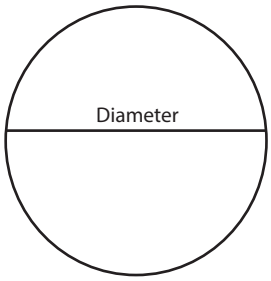
Mighty Microgreens

Name: _____

Directions: Follow the steps listed below to determine how many seeds to plant in the container. After planting the microgreens, track the plant's growth using the space provided.

Step 1: Calculate the area of the container you will use to grow seeds in.
To determine the amount of seeds needed for the provided container, start by determining the area of the container.

Circular shaped containers: Area = π x diameter^2 ÷ 4



1. Begin by measuring the diameter in inches and list the measurement in the formula below.

Area = π x _____ in.^{2} ÷ 4
Diameter

2. After, solve the equation above to determine the area of the container.

Area = _____ sq.in.

Step 2: Determine the amount of seeds to plant in the container.
As a general rule, plant 11 seeds per inch for small seeds or 7 seeds per inch for larger seeds.

1. Calculate the total number of seeds per container using the formula below. With your teacher, determine the amount of seeds per inch to use in the calculation based on the size of seeds that will be provided.

Number of seeds per container = Seeds/sq. in x Area

Number of seeds per container = _____

Step 3: Plant your microgreens!
1. Fill the container nearly full with soil.

2. Your teacher will fill a growing flat or tray with water, place your soil container on the tray to begin to wet the soil.

3. Once the soil has soaked up water and is moist, remove the container from the water. Stack the nesting conatiner (without holes) on the bottom of the container with soil. You will use the nesting container to add water to your plant in the future.

4. Using the amount of seeds determined in **Step 2**, evenly distribute seeds across the container.

5. Place your planted container in the area designated by your teacher. Your teacher will cover the containers or place them in a dark area until germination has occurred. If needed add water to the nesting tray if the soil becomes too dry.

6. Place the tray of containers in a dark area until germination has occurred. If needed spray the soil with a water spray bottle to keep the area moist during germination.

7. After seeds have germinated, place the plants in an area where they will be in direct light near a window.

8. As the seeds begin to grow, track their growth by diagramming it in the boxes below. Observe the plant's growth every 2-3 days.

Day _____	Day _____	Day _____	Day _____
Day _____	Day _____	Day _____	Day _____

Activity Page

Mighty Microgreens

Name: _____

Directions: Follow the steps listed below to determine how many seeds to plant in the container provided by your teacher. After planting the microgreens, track the plant's growth using the space provided on this worksheet.

Step 1: Calculate the area of the container you will use to grow seeds in.
To determine the amount of seeds needed for the provided container, start by determining the area of the container.

Square or rectangular shaped containers: Area = width x length

1. Begin by measuring the width and length in inches and list the measurement in the formula below.

Area = _____ in. x _____ in.
Width Length

2. After, solve the equation above to determine the area of the container.

Area = _____ sq. in.

Step 2: Determine the amount of seeds to plant in the container.
As a general rule, plant 11 seeds per inch for small seeds or 7 seeds per inch for larger seeds.

1. Calculate the total number of seeds per container using the formula below. With your teacher, determine the amount of seeds per inch to use in the calculation based on the size of seeds that will be provided.

Number of seeds per container = Seeds/sq. in x Area

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