

To view this meeting, the livestream link is: <https://vimeo.com/event/729428>

To make a public comment, the call in number is (US) 1-321-586-2412  
The PIN is 141 368 133#

Board of Education  
December 6, 2022

Council Chambers  
7:00 p.m.

*As citizens of our community, we will conduct ourselves in accordance with Newtown's Core Character Attributes as displayed in our character tree. We will be responsible for our actions and show respect for each other. We will interact peacefully, productively, and politely. We will be trustworthy and honest and show compassion toward others. Newtown's continued success is contingent upon our ability to persevere, to follow through with our commitments, and to stay focused on the greater good.*

## A G E N D A

- Item 1 PLEDGE OF ALLEGIANCE
- Item 2 CONSENT AGENDA
- Donation to Sandy Hook School
  - Correspondence Report
- Item 3 \*\*PUBLIC PARTICIPATION
- Item 4 REPORTS
- Chair Report
  - Superintendent's Report
  - Committee Reports
  - Student Representatives Report
- Item 5 PRESENTATIONS
- First Read of AP Calculus A/B
  - First Read of AP Calculus B/C
  - Special Education Overview
  - Reading Program Review/Update
- Item 6 OLD BUSINESS
- Update on Strategic Plan Process
  - Second Read and Possible Action on Greenery 1 & 2 Curriculum
- Item 7 NEW BUSINESS
- Discussion of 2023 Board of Education Schedule of Meetings
  - Discussion of 2023 Standing Committees
  - Action on the Minutes of November 15, 2022
- Item 8 \*\*PUBLIC PARTICIPATION
- Item 9 ADJOURNMENT

*\*\*The Board encourages the public to share thoughts and concerns at two points during Regular Meetings. During the first Public Participation, the Board welcomes commentary regarding items on the agenda. During the second Public Participation, commentary may also include issues for the Board to consider in the future. After being recognized, please state your name and address for the record. We request that speakers be respectful and limit comments to three minutes. The Board of Education does not discuss personnel items or student matters in public nor does it engage in dialogue during either public comment period. If you desire more information or responses to specific questions, please email the Board.*

12 Dickinson Drive  
Sandy Hook, CT 06482  
(203) 426-7657

**Sandy Hook School**

# Memo

**To:** Mr. Melillo  
**From:** Erin Ardino  
**cc:**  
**Date:** December 2, 2022  
**Re:** Donation from Curtis L Dupuis

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Sandy Hook School received the attached \$100 donation Curtis L Dupuis. This donation is to be used towards additional classroom purchases.

We are asking for approval of this donation. Once approved, we will deposit the check into the SHS Activity Account to be spent appropriately.

If you have any questions, please contact our office.

Thank you!

TO: Chris Melillo, Superintendent  
FROM: Suzanne D'Eramo, Director of Human Resources  
RE: Superintendent's Report – Staffing Update for **NOVEMBER 2022**  
DATE: December 1, 2022

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**NOVEMBER 2022**

**CERTIFIED RETIREMENTS:**

Carol Danenberg – Lead Teacher HOM (effective 1/27/23)

**CERTIFIED RESIGNATIONS:**

None

**CERTIFIED NEW HIRES:**

None

**CERTIFIED OPEN POSITIONS:**

Lead Teacher - HOM

**ADDITIONAL DISTRICT HIRING NOTES:**

Here is a recap of all certified/non-certified staff who began working in November:

Paraeducators = 2

Custodians = 2

NELC = 1

Coach = 1

Of the 6 newly hired employees, 2 indicated a diverse ethnicity or race other than white. This equates to a total of 33% broken down as follows:

Black = 1

Hispanic = 1



# AP Calculus A/B (College Board AP)

7 Curriculum Developers | Last Updated: Monday, Jun 27, 2022 by Cavataro, Charlotte

## Unit Calendar by Year

Unit	Au	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Ju																														
Lessons	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38			
Limits	█																																								
Differentiation				█																																					
Applications of Differentiation										█																															
Integration																										█															
Applications of Integration																																									
Differential Equations																											█														
4																																									
6 Units found																																									
Previous Year																																									

# Unit Planner: Limits

## AP Calculus A/B

File Path: November 16, 2022, 12:49PM

Newtown High  
School /  
2022-2023 /  
Grade 12 /

Mathematics / Last Updated: Sunday, June 26, 2022 by Charlotte Cavatara  
AP Calculus A/B  
(College Board  
AP) / Week 1 -  
Week 5

### Limits

Cavatara, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Keristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

*Please attach your completed Unit Web Template here*

##### Concepts

- Properties
- Limit Existence Theorem
- One-Sided Limits
- Infinity
- Limit existence

#### Lens: Estimation

G

#### Generalizations / Enduring Understandings

Strand 1: Evaluate

Concepts:

- Properties
- Limit Existence Theorem
- One-Sided Limits
- Infinity

Generalization:

Limits of a function evaluated graphically or algebraically use the properties and the limit existence theorem.

One-sided limits, limits at infinity, and limits as  $x$  approaches a constant derives the definition of a limit.

Strand 2: Continuity

Concepts:

- Defined
- Limit existence

Generalization:

#### Guiding Questions

*Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]*

Factual:

- What are the properties of limits? (S1)
- What is the limit existence theorem? (S1)
- What is a one-sided limit? (S1)
- What is the proper notation for a limit? (S1)
- What is the definition of continuity? (S2)
- What does it mean for a function to be continuous? (S2)
- How can limits at a discontinuity be evaluated? (S1)
- When do limits fail to exist? (S1)

Conceptual:

- How can properties of limits be used to evaluate complex limits? (S1)
- How can limits be used to develop the definition of derivatives? (S1)

<p>For continuity to exist at a point, the functions defined value equals the limit at that point.</p>	<ul style="list-style-type: none"> <li>• How can a function be undefined but still have a limit? (S1/S2)</li> </ul> <p>Provocative:</p> <ul style="list-style-type: none"> <li>• How can limits be effectively used in real-world applications? (S1/S2)</li> <li>• Why are one-sided limits equal to infinity, but the limit existence theorem does not allow the limit to exist? (S1/S2)</li> </ul>
<p><b>Standard(s)</b> <i>Connecticut Core Standards / Content Standards</i></p>	
<p><b>Critical Content &amp; Skills</b> <i>What students must <b>KNOW and be able to DO</b></i> Students must be able to: Evaluate limits from a graph or from an expression Define continuity from a graph or an expression</p>	
<p><b>Core Learning Activities</b> Evaluate limits from a graph or from an expression</p> <ul style="list-style-type: none"> <li>• Given a limit, evaluate algebraically.</li> <li>• Evaluate a limit given a graph.</li> <li>• Define where limits do not exist based on a graph.</li> <li>• Evaluate one-sided limits from a graph or algebraically.</li> <li>• Use properties of limits to evaluate.</li> </ul> <p>Define continuity from a graph or an expression</p> <ul style="list-style-type: none"> <li>• Determine if continuity exists at key points of a piecewise function.</li> <li>• Find the value of a variable that will make a function continuous at a given point.</li> <li>• Determine if continuity exists algebraically.</li> </ul>	
<p><b>Assessments</b> <b>Summative Assessment</b> <b>Summative: Written Test</b> Sample Assessment <a href="#">Review for Quiz on Limits (Sections 1.6-1.8).pdf</a> <a href="#">Review for Quiz on Limits.pdf</a></p>	<p><b>Resources</b> <i>Professional &amp; Student</i> Department developed materials on google drive.</p>
<p><b>Student Learning Expectation &amp; 21st Century Skills</b> <a href="#">Information Literacy</a> <a href="#">Critical Thinking</a> <a href="#">Spoken Communication</a> <a href="#">Written Performance</a></p>	<p><b>Interdisciplinary Connections</b> Physics-Rate of Change</p>

# Unit Planner: Differentiation

## AP Calculus A/B

Monday, November 14, 2022, 12:42PM

Newtown High

School /

2022-2023 /

Grade 12 /

Mathematics /

Last Updated: [Monday, June 27, 2022](#) by Megan Guarino

AP Calculus A/B

(College Board

AP) / Week 6 -

Week 13

Differentiation

Cavataro, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Keristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

Concepts / Conceptual Lens

*Please attach your completed Unit Web Template here*

Concept: Differentiation

- Difference Quotient
- Limit
- Derivative
- Average Rate
- Instantaneous Rate
- Rules of differentiation
- Continuity
- Differentiability

Lens: Properties

G

Generalizations / Enduring Understandings

Strand 1: Derivatives

- Difference Quotient
- Limit
- Derivative
- Average Rate
- Instantaneous Rate
- Rules of differentiation

Generalization:

The average rate of change of a function is a difference quotient.

The instantaneous rate of change or derivative is the limit of difference quotient.

Mathematical rules and procedures exist to calculate the derivatives of different types of functions.

Strand 2: Differentiability

Guiding Questions

*Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]*

Factual

What are the derivative rules? (S1)

How is the derivative of a function found? (S1)

What is the definition of a derivative? (S1)

What is the difference between average rate of change and instantaneous rate of change? (S1)

What is an implicit function? (S1)

Conceptual

How is the rate of change determined? (S1)

How is the instantaneous rate of change determined? (S1)

Why are implicit functions needed? (S1)

Why are higher order derivatives needed? (S1)

How is differentiability determined? (S2)

How is continuity and differentiability related? (S2)

<ul style="list-style-type: none"> <li>• Continuity</li> <li>• Differentiability</li> </ul> <p>Generalization:</p> <p>Differentiability implies continuity.</p>	<p>How is rate of change using the tangent line estimated? (S1)</p> <p>How is the chain rule to differentiate a composite function used? (S1)</p> <p>How is the second derivative found? (S1)</p> <p>How is the chain rule used to take the derivative of an implicit function? (S1)</p> <p>How is the derivative of an inverse function found? (S1)</p> <p>Provocative</p> <p>What is the best approach to finding the derivative of a function? (S1)</p>
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## Standard(s)

*Connecticut Core Standards / Content Standards*

## Critical Content & Skills

*What students must **KNOW and be able to DO***

Students must be able to:

- Find the derivatives of various functions using the limit of a difference quotient.
- Apply appropriate mathematical rules or procedures to differentiate.
- Determine if a function is continuous and differentiable.

## Core Learning Activities

Find the derivatives of various functions using the limit of a difference quotient.

- Calculate average rate of change of various functions using difference quotients.
- Find the derivative of a function using the limit of a difference quotient and estimate the rate of change at a given point.

Apply appropriate mathematical rules or procedures to differentiate.

- Evaluate the slope at a particular point to write the tangent line.
- Apply the power rule to differentiate a function.
- Apply the constant property to differentiate a function.
- Apply the sum or difference property to differentiate a function.
- Apply the constant multiple property to differentiate a function.
- Apply the quotient rule to differentiate a function.
- Apply appropriate rules and properties to differentiate trigonometric, exponential, and logarithmic functions.
- Connect and understand the relationship of the function to its derivative as it relates to degree and shape.
- Find the derivative of a function using derivative rules and calculate the rate of change at a given point.
- Find the derivative of a composite function and evaluate the function at a given point to write the equation of a tangent line.
- Find the derivative of an implicit function and evaluate the function at a given point to write the equation of a tangent line.
- Find the derivative of an inverse function and evaluate the function at a given point to find the equation of a tangent line.
- Find the derivative of an inverse trigonometric function and evaluate the function at a given point to find the equation of tangent line.
- Apply properties and rules of differentiation to find the derivative of higher order derivatives.
- Connect and understand the relationship of the function to its derivative as it relates to degree and shape.

Determine if a function is continuous and differentiable.

- Use limits to determine continuity.



- Understand that differentiability implies continuity.
- Understand discontinuities ie. asymptotes, hole, jump.

[Unit 2 - Notes & Assignemts.pdf](#)

### Assessments

#### Review

#### Summative: Other written assessments

[Calculus Ch -2 PT .pdf](#)

### Resources

#### Professional & Student

Department developed materials on google drive.

<https://apstudents.collegeboard.org/ap/pdf/ap-calculus-ab-bc-course-and-exam-description.pdf>

### Student Learning Expectation & 21st Century Skills

[Information Literacy](#)

[Critical Thinking](#)

[Spoken Communication](#)

[Written Performance](#)

### Interdisciplinary Connections

Physics - Derivative as rate of change

# Unit Planner: Applications of Differentiation

## AP Calculus A/B

Version: November 14, 2022 12:19PM

Newtown High

School /

2022-2023 /

Grade 12 /

Mathematics /

Last Updated: Monday, June 27, 2022 by Megan Guarino

AP Calculus A/B

(College Board

AP) / Week 14 -

Week 21

Applications of Differentiation

Cavataro, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Keristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

Concepts / Conceptual Lens

*Please attach your completed Unit Web Template here*

Concepts: Analytical

- First Derivative Test
- Second Derivative Test
- Mean Value Theorem
- Extreme Value Theorem
- Optimization
- Related Rates
- Particle Motion
- L'Hopital's Rule

Lens: Connection

G

Generalizations / Enduring Understandings

Strand 1: Key Characteristics of a Function

- First Derivative Test
- Second Derivative Test
- Mean Value Theorem
- Extreme Value Theorem

Generalization:

The First and Second Derivative tests determine the key characteristics of a function.

Mean Value Theorem and Extreme Value Theorem are essential theorems of differential calculus.

Strand 2: Applications of Differentiation

- Optimization

Guiding Questions

*Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]*

Factual

What is the Mean Value Theorem? (S1)

What is Extreme Value Theorem? (S1)

How is the first derivative test used? (S1)

How is the second derivative test used? (S1)

What are extrema? (S1)

Conceptual

What does it mean for a function to be increasing or decreasing? (S1)

What does it mean for a function to have a positive or negative concavity in a certain interval? (S1)

How do the minimum and maximum relate to optimization problems? (S2)

How is concavity determined? (S1)

<ul style="list-style-type: none"> <li>• Related Rates</li> <li>• Particle Motion</li> <li>• L'Hopital's Rule</li> </ul> <p>Generalization: Optimization, related rates, and particle motion are real world applications of differentiation. L'Hopital's rule is an application of differentiation applied to limits.</p>	<p>How are intervals of increasing or decreasing determined? (S1) How can the rate of one variable be used to find the rates of others? (S2) How is L'Hospital's Rule used? (S3) When is L'Hospital's Rule used? (S3) How are functions rewritten to limit the number of variables in order to apply related rates? (S2)</p> <p>Provocative Where can optimization, related rates or particle motion be used in the real world? (S2) What role does Calculus play as a tool in science, business, and other areas of study? (S1/S2) What is the most efficient way to solve a related rates problem? (S2)</p>
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**Standard(s)**

*Connecticut Core Standards / Content Standards*

**Critical Content & Skills**

*What students must KNOW and be able to DO*

Students must be able to:

- Justify conclusions about the behavior of a function based on the behavior of its derivatives.
- Solve real world problems
- Use L'Hospital's Rule to evaluate limits.

**Core Learning Activities**

Justify conclusions about the behavior of a function based on the behavior of its derivatives.

- Use the Mean Value Theorem to sketch graphs.
- Use Rolle's Theorem to determine a maximum or minimum value.
- Use Extreme Value Theorem to find the absolute minimum or absolute maximum values.
- Use the first derivative test to describe the function's behavior in an interval and determine a critical value.
- Use the second derivative test to determine concavity and classify points of inflection.
- Create an accurate graph without the use of technology.

Solve real world problems

- Solve optimization problems
- Solve Related Rates problems
- Solve Particle Motion problems

Use L'Hospital's Rule to evaluate limits.

- Limits of indeterminate forms may be evaluated

[Unit 5 - Notes & Assignments.pdf](#)

[Unit 6 - Notes & Assignments.pdf](#)

**Assessments**

**Review**

**Summative: Other written assessments**

[5. Review for Quiz on Applications of Derivatives Part II.pdf](#)

[5. Review for Quest on Applications of Derivatives.pdf](#)

**Resources**

*Professional & Student*

Department developed materials on google drive.

<https://apstudents.collegeboard.org/ap/pdf/ap-calculus-ab-bc-course-and-exam-description.pdf>

<p>Student Learning Expectation &amp; 21st Century Skills</p> <p><u>Information Literacy</u></p> <p><u>Critical Thinking</u></p> <p><u>Spoken Communication</u></p> <p><u>Written Performance</u></p>	<p>Interdisciplinary Connections</p> <p>Farming, construction, architecture, business-Area, perimeter, volume</p>

# Unit Planner: Integration

## AP Calculus A/B

Monday, November 14, 2022, 12:44PM

Newtown High

School /

2022-2023 /

Grade 12 /

Mathematics /

Last Updated: [Monday, June 27, 2022](#) by Paige Hyman

AP Calculus A/B

(College Board

AP) / Week 22 -

Week 25

### Integration

Cavataro, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Keristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

*Please attach your completed Unit Web Template here*

Concept: Integration

- Riemann Sum
- definite integrals
- area under a curve
- indefinite integration
- rules of integration
- Fundamental Theorem of Calculus

Lens: Change

G

#### Generalizations / Enduring Understandings

Strand 1: Definite Integration

Concepts:

- Riemann Sum
- definite integrals
- area under a curve

Generalization:

A definite integral represents the area under a curve over a given interval.

Riemann sums use geometric and numerical methods to approximate definite integrals.

Strand 2: Indefinite Integration

Concepts:

- indefinite integration

#### Guiding Questions

*Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]*

Factual:

What is a definite integral? (S1)

What does the area of the region between the graph of a rate of change function and the x-axis represent? (S1)

What is the difference between areas above and areas below the x-axis? (S1)

What is a Riemann sum? (S1)

What is the Fundamental Theorem of Calculus? (S2)

What is the difference between differentiation and integration? (S2)

What is the difference between indefinite and definite integrals? (S2)

What patterns indicate the need for integration using substitution? (S2)

What does it mean for a sum to diverge? (S2)

<ul style="list-style-type: none"> <li>• rules of integration</li> <li>• Fundamental Theorem of Calculus</li> </ul> <p>Generalization: Indefinite Integration is the inverse of differentiation. Mathematical rules and procedures exist to evaluate the integral of different types of functions. The Fundamental Theorem of Calculus connects differentiation and integration.</p>	<p><u>Conceptual:</u> Given information about a rate of change, how can we determine the net change over a given interval of time? (S1) How can definite integrals be approximated using geometric and numerical methods? (S2) When is it appropriate to use geometry to evaluate an integral? (S2) Given information on velocity, how can the Fundamental Theorem of Calculus be used to determine position? (S2) How is integrating to find areas related to differentiating to find slopes?(S2) How can rearranging function into equivalent forms allow us to find anti-derivatives efficiently? (S2)</p> <p><u>Provocative:</u> How is it possible for the area of an unbounded region to be finite? (S2)</p>
<p>Standard(s) <i>Connecticut Core Standards / Content Standards</i> <u>Calculus Standards</u></p>	
<p>Critical Content &amp; Skills <i>What students must <b>KNOW and be able to DO</b></i> Students will be able to</p> <ul style="list-style-type: none"> <li>• Apply the Properties of Integrals</li> <li>• Apply Riemann Sums</li> <li>• Apply the Fundamental Theorem of Calculus</li> </ul>	
<p>Core Learning Activities Apply Riemann Sums</p> <ul style="list-style-type: none"> <li>• Approximate areas under a curve using the sum of areas of basic geometric shapes.</li> <li>• Interpret the limiting case of the Riemann sum as a definite integral.</li> <li>• Represent the limiting case of the Riemann sum as a definite integral.</li> </ul> <p>Apply the Fundamental Theorem of Calculus</p> <ul style="list-style-type: none"> <li>• Connect the area under the graph of a functions derivative with the net change in the function.</li> <li>• Solve Problems related to the motion of a particle along a line.</li> </ul> <p>Apply the Properties of Integrals</p> <ul style="list-style-type: none"> <li>• Apply basic integration rules to find the integral of a function.</li> <li>• Use the inverse process of differentiation to find the antiderivative of functions.</li> </ul>	
<p>Assessments <u>Exam Sample Questions</u></p>	<p>Resources <i>Professional &amp; Student</i> AP Classroom Department developed materials online resources</p>
<p>Student Learning Expectation &amp; 21st Century Skills</p>	<p>Interdisciplinary Connections</p>

Information Literacy  
Critical Thinking  
Spoken Communication  
Written Performance

Economics - If compounding more often increases the amount in an account with a given rate of return and term, why doesn't compounding continuously result in an infinite account balance, all other things being equal?  
Physics - Particle Motion

# Unit Planner: Applications of Integration

## AP Calculus A/B

Monday, November 14, 2022, 12:42PM

Newtown High

School /

2022-2023 /

Grade 12 /

Mathematics / Last Updated: Monday, June 27, 2022 by Charlotte Cavatara

AP Calculus A/B

(College Board

AP) / Week 30 -

Week 33

### Applications of Integration

Cavatara, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Keristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

*Please attach your completed Unit Web Template here*

Concept: Applications of Integration

- integral defined function
- The Second Fundamental Theorem of Calculus
- average value of a function
- area between two curves
- volume of solids

Lens: transformation

G

#### Generalizations / Enduring Understandings

Strand 1: Real World Applications

Concepts:

- integral defined function
- The Second Fundamental Theorem of Calculus
- average value of a function

Generalization:

The Second Fundamental Theorem of Calculus gives an equation for the derivative of an integral defined function. The average value of a function is solved by definite integrals.

Strand 2: Area and Volume Applications

Concepts:

- area between two curves
- volume of solids

Generalization:

#### Guiding Questions

***Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]***

Factual:

What is the average value of a function? (S1)  
How do position, velocity, and acceleration relate? (S1)  
What are the methods to calculate volume of solids? (S2)

Conceptual:

How can differentiation and antidifferentiation help to move between position, velocity, and acceleration functions? (S1)  
When should each method to calculate volume of solids be used? (S2)

Provocative:

Is the same solution achieved when finding the volume of a three dimensional figure using different methods? (S2)  
How can integration be used to explain that the formulas for areas of two dimensional geometric figures relate to the volume of their three dimensional counterparts? (S2)



<p>Definite integrals solve for areas between two curves and volumes of solids.</p>	<p>If the width of a rectangle is infinitesimally small is it still two dimensional? (S2)</p>
<p><b>Standard(s)</b>  <i>Connecticut Core Standards / Content Standards</i>  <u>Calculus Standards</u></p>	
<p><b>Critical Content &amp; Skills</b>  <i>What students must <b>KNOW and be able to DO</b></i>  Students will be able to:</p> <ul style="list-style-type: none"> <li>• Apply the Second Fundamental Theorem of Calculus in Real World problems</li> <li>• Use integrals to solve for area under a curve and volume of solids</li> </ul>	
<p><b>Core Learning Activities</b>  Apply the Second Fundamental Theorem of Calculus in Real World problems</p> <ul style="list-style-type: none"> <li>• determine the average value of a function using definite integrals</li> <li>• determine values for positions and rates of change using definite integrals in problems involving rectilinear motions</li> <li>• calculate areas in the plane using the definite integral</li> </ul> <p>Use integrals to solve for area under a curve and volume of solids</p> <ul style="list-style-type: none"> <li>• calculate volumes of solids with known cross sections using definite integrals</li> <li>• calculate volumes of solids of revolution using definite integrals</li> <li>• determine the length of a curve in the plane defined by a function, using a definite integral</li> </ul>	
<p><b>Assessments</b>  <u>Sample Exam Questions</u></p>	<p><b>Resources</b>  <i>Professional &amp; Student</i>  AP Classroom  Department developed materials  online resources</p>
<p><b>Student Learning Expectation &amp; 21st Century Skills</b>  <u>Information Literacy</u>  <u>Critical Thinking</u>  <u>Spoken Communication</u>  <u>Written Performance</u></p>	<p><b>Interdisciplinary Connections</b>  Physics- particle motion</p>

# Unit Planner: Differential Equations

## AP Calculus A/B

Monday, September 14, 2022 12:45:04

Newtown High

School /

2022-2023 /

Grade 12 /

Mathematics / Last Updated: Monday, June 27, 2022 by Charlotte Cavatara

AP Calculus A/B

(College Board

AP) / Week 26 -

Week 29

### Differential Equations

Cavatara, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Keristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

*Please attach your completed Unit Web Template here*

Concept: Different Equations

- differential equations
- slope fields
- general solution
- particular solution
- exponential growth and decay
- gravity

Lens: Analysis

G

#### Generalizations / Enduring Understandings

Strand 1: Differential Equations

Concepts:

- differential equations
- slope fields
- general solution
- particular solution

Generalization:

A differential equation is the derivative of a family of functions.

A slope fields represents all possible general solutions to a differential equation.

The particular solution to a differential equation is a unique solution based on a given initial condition.

Strand 2: Applications of Differential Equations

Concepts:

#### Guiding Questions

*Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]*

Factual:

What is the difference between a general solution and a particular solution? (S1)

What is a slope field? (S1)

What is the difference between exponential growth and decay? (S1)

What is the gravitational constant? (S2)

Conceptual:

How can you identify the behavior of a particular solution using a slope field? (S1)

How is the particular solution graphed on a slope field? (S1)  
How do the general solutions of a differential equation vary? (S1)

How are differential equations used to model exponential growth and decay? (S2)

How are differential equations used to model acceleration due to gravity? (S2)

<ul style="list-style-type: none"> <li>• exponential growth and decay</li> <li>• gravity</li> </ul> <p>Generalization: Exponential growth and decay and acceleration due to gravity can be modeled using differential equations.</p>	<p><u>Provocative:</u> Can a model be derived for the number of computers, <math>C</math>, infected by a virus, given a model for how fast the computers are being infected, <math>dC/dt</math>, at a particular time? (S1)</p>
<p>Standard(s) <i>Connecticut Core Standards / Content Standards</i> <u>Calculus Standards</u></p>	
<p>Critical Content &amp; Skills <i>What students must KNOW and be able to DO</i> Students will be able to:</p> <ul style="list-style-type: none"> <li>• Solve differential equations</li> <li>• Apply differential equations</li> </ul>	
<p>Core Learning Activities Solve differential equations</p> <ul style="list-style-type: none"> <li>• Interpret verbal statements of problems as differential equations involving a derivative expression</li> <li>• Verify solutions to a differential equation</li> <li>• Estimate solutions to differential equations</li> <li>• Determine general solutions to differential equations</li> <li>• Determine particular solutions to differential equations</li> </ul> <p>Apply differential equations</p> <ul style="list-style-type: none"> <li>• Interpret the meaning of a differential equation and its variables in context</li> <li>• Determine general and particular solutions for problems involving differential equations in context</li> </ul>	
<p>Assessments <u>Exam Sample Question</u></p>	<p>Resources <i>Professional &amp; Student</i> AP Classroom Department developed materials online resources</p>
<p>Student Learning Expectation &amp; 21st Century Skills <u>Information Literacy</u> <u>Critical Thinking</u> <u>Spoken Communication</u> <u>Written Performance</u></p>	<p>Interdisciplinary Connections Physics - Particle motion Economics - Exponential growth and decay</p>



# AP Calculus B/C (College Board AP)

7 Curriculum Developers | Last Updated: Tuesday, Jun 28, 2022 by Guarino, Megan

## Unit Calendar by Year

Unit	Au	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Ju																												
Lessons	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
Differentiation	0																																						
Applications of Differentiation	0																																						
Integration	0																																						
Applications of Integration	0																																						
Differential Equations	0																																						
Parametric, Polar, and Vector...	0																																						
Infinite Sequences and Series	0																																						

7 Units found

Previous Year

# Unit Planner: Differentiation

## AP Calculus B/C

Unit Planner: Unit 19, 2022 141011

Newtown High  
School /  
2022-2023 /  
Grade 12 /

Mathematics / Last Updated: Tuesday, June 28, 2022 by Paige Hyman  
AP Calculus B/C  
(College Board  
AP) / Week 1 -  
Week 4

### Differentiation

Cavataro, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Keristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

*Please attach your completed Unit Web Template here*

Concept: Differentiation

- Difference Quotient
- Limit
- Derivative
- Average Rate
- Instantaneous Rate
- Rules of differentiation
- Continuity
- Differentiability

Lens: Properties

G

#### Generalizations / Enduring Understandings

Strand 1: Derivatives

- Difference Quotient
- Limit
- Derivative
- Average Rate
- Instantaneous Rate
- Rules of differentiation

Generalization:

The average rate of change of a function is a difference quotient.

The instantaneous rate of change or derivative is the limit of difference quotient.

Mathematical rules and procedures exist to calculate the derivatives of different types of functions.

Strand 2: Differentiability

#### Guiding Questions

*Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]*

Factual

What are the derivative rules? (S1)

How is the derivative of a function found? (S1)

What is the definition of a derivative? (S1)

What is the difference between average rate of change and instantaneous rate of change? (S1)

What is an implicit function? (S1)

Conceptual

How is the rate of change determined? (S1)

How is the instantaneous rate of change determined? (S1)

Why are implicit functions needed? (S1)

Why are higher order derivatives needed? (S1)

How is differentiability determined? (S2)

How is continuity and differentiability related? (S2)

- Continuity
- Differentiability

Generalization:

Differentiability implies continuity.

How is rate of change using the tangent line estimated? (S1)  
 How is the chain rule to differentiate a composite function used? (S1)  
 How is the second derivative found? (S1)  
 How is the chain rule used to take the derivative of an implicit function? (S1)  
 How is the derivative of an inverse function found? (S1)

Provocative  
 What is the best approach to finding the derivative of a function? (S1)

## Standard(s)

*Connecticut Core Standards / Content Standards*

## Critical Content & Skills

*What students must **KNOW and be able to DO***

Students must be able to:

- Find the derivatives of various functions using the limit of a difference quotient.
- Apply appropriate mathematical rules or procedures to differentiate.
- Determine if a function is continuous and differentiable.

## Core Learning Activities

Find the derivatives of various functions using the limit of a difference quotient.

- Calculate average rate of change of various functions using difference quotients.
- Find the derivative of a function using the limit of a difference quotient and estimate the rate of change at a given point.

Apply appropriate mathematical rules or procedures to differentiate.

- Evaluate the slope at a particular point to write the tangent line.
- Apply the power rule to differentiate a function.
- Apply the constant property to differentiate a function.
- Apply the sum or difference property to differentiate a function.
- Apply the constant multiple property to differentiate a function.
- Apply the quotient rule to differentiate a function.
- Apply appropriate rules and properties to differentiate trigonometric, exponential, and logarithmic functions.
- Connect and understand the relationship of the function to its derivative as it relates to degree and shape.
- Find the derivative of a function using derivative rules and calculate the rate of change at a given point.
- Find the derivative of a composite function and evaluate the function at a given point to write the equation of a tangent line.
- Find the derivative of an implicit function and evaluate the function at a given point to write the equation of a tangent line.
- Find the derivative of an inverse function and evaluate the function at a given point to find the equation of a tangent line.
- Find the derivative of an inverse trigonometric function and evaluate the function at a given point to find the equation of tangent line.
- Apply properties and rules of differentiation to find the derivative of higher order derivatives.
- Connect and understand the relationship of the function to its derivative as it relates to degree and shape.

Determine if a function is continuous and differentiable.

- Use limits to determine continuity.

- Understand that differentiability implies continuity.
- Understand discontinuities ie. asymptotes, hole, jump.

### Assessments

[3. Review-Implicit Differentiation.pdf](#)

### Resources

*Professional & Student*

Department developed materials on google drive.

<https://apstudents.collegeboard.org/ap/pdf/ap-calculus-ab-bc-course-and-exam-description.pdf>

### Student Learning Expectation & 21st Century Skills

[Information Literacy](#)

[Critical Thinking](#)

[Spoken Communication](#)

[Written Performance](#)

### Interdisciplinary Connections

Physics-Second derivative is acceleration.

Business-Supply and demand curves.

# Unit Planner: Applications of Differentiation

## AP Calculus B/C

Thursday, November 10, 2022, 3:48 PM

Newtown High

School /

2022-2023 /

Grade 12 /

Mathematics / Last Updated: [Tuesday, June 28, 2022](#) by Paige Hyman

AP Calculus B/C

(College Board

AP) / Week 5 -

Week 11

### Applications of Differentiation

Cavataro, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Keristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

*Please attach your completed Unit Web Template here*

Concepts: Analytical

- First Derivative Test
- Second Derivative Test
- Mean Value Theorem
- Extreme Value Theorem
- Optimization
- Related Rates
- Particle Motion
- L'Hopital's Rule

Lens: Connection

G

#### Generalizations / Enduring Understandings

Strand 1: Key Characteristics of a Function

- First Derivative Test
- Second Derivative Test
- Mean Value Theorem
- Extreme Value Theorem

Generalization:

The First and Second Derivative tests determine the key characteristics of a function.

Mean Value Theorem and Extreme Value Theorem are essential theorems of differential calculus.

Strand 2: Applications of Differentiation

- Optimization

#### Guiding Questions

*Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]*

Factual

What is the Mean Value Theorem? (S1)

What is Extreme Value Theorem? (S1)

How is the first derivative test used? (S1)

How is the second derivative test used? (S1)

What are extrema? (S1)

Conceptual

What does it mean for a function to be increasing or decreasing? (S1)

What does it mean for a function to have a positive or negative concavity in a certain interval?(S1)

How do the minimum and maximum relate to optimization problems? (S2)

How is concavity determined? (S1)



<ul style="list-style-type: none"> <li>• Related Rates</li> <li>• Particle Motion</li> <li>• L'Hopital's Rule</li> </ul> <p>Generalization: Optimization, related rates, and particle motion are real world applications of differentiation. L'Hopital's rule is an application of differentiation applied to limits.</p>	<p>How are intervals of increasing or decreasing determined? (S1) How can the rate of one variable be used to find the rates of others? (S2) How is L'Hospital's Rule used? (S3) When is L'Hospital's Rule used? (S3) How are functions rewritten to limit the number of variables in order to apply related rates? (S2)</p> <p>Provocative Where can optimization, related rates or particle motion be used in the real world? (S2) What role does Calculus play as a tool in science, business, and other areas of study? (S1/S2) What is the most efficient way to solve a related rates problem? (S2)</p>
<p><b>Standard(s)</b> <i>Connecticut Core Standards / Content Standards</i></p>	
<p><b>Critical Content &amp; Skills</b> <i>What students must <b>KNOW and be able to DO</b></i> Students must be able to:</p> <ul style="list-style-type: none"> <li>• Justify conclusions about the behavior of a function based on the behavior of its derivatives.</li> <li>• Solve real world problems</li> <li>• Use L'Hospital's Rule to evaluate limits.</li> </ul>	
<p><b>Core Learning Activities</b> Justify conclusions about the behavior of a function based on the behavior of its derivatives.</p> <ul style="list-style-type: none"> <li>• Use the Mean Value Theorem to sketch graphs.</li> <li>• Use Rolle's Theorem to determine a maximum or minimum value.</li> <li>• Use Extreme Value Theorem to find the absolute minimum or absolute maximum values.</li> <li>• Use the first derivative test to describe the function's behavior in an interval and determine a critical value.</li> <li>• Use the second derivative test to determine concavity and classify points of inflection.</li> <li>• Create an accurate graph without the use of technology.</li> </ul> <p>Solve real world problems</p> <ul style="list-style-type: none"> <li>• Solve optimization problems</li> <li>• Solve Related Rates problems</li> <li>• Solve Particle Motion problems</li> </ul> <p>Use L'Hospital's Rule to evaluate limits.</p> <ul style="list-style-type: none"> <li>• Limits of indeterminate forms may be evaluated.</li> </ul>	
<p><b>Assessments</b> <b>Review</b> <b>Summative: Other written assessments</b> <a href="#">5. Review for Quiz on Applications of Derivatives Part II.pdf</a> <a href="#">5. Review for Quest on Applications of Derivatives.pdf</a></p>	<p><b>Resources</b> <i>Professional &amp; Student</i> Department developed materials on google drive. <a href="https://apstudents.collegeboard.org/ap/pdf/ap-calculus-ab-bc-course-and-exam-description.pdf">https://apstudents.collegeboard.org/ap/pdf/ap-calculus-ab-bc-course-and-exam-description.pdf</a></p>

**Student Learning Expectation & 21st Century Skills**

Information Literacy

Critical Thinking

Spoken Communication

Written Performance

**Interdisciplinary Connections**

Farming, construction, architecture, business-Area, perimeter, volume

# Unit Planner: Integration

## AP Calculus B/C

Thursday, December 10, 2022, 3:47PM

Newtown High

School /

2022-2023 /

Grade 12 /

Mathematics / Last Updated: [Tuesday, June 28, 2022](#) by Paige Hyman

AP Calculus B/C

(College Board

AP) / Week 12 -

Week 15

### Integration

Cavataro, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Keristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

*Please attach your completed Unit Web Template here*

Concept: Integration

- Riemann Sum
- definite integrals
- area under a curve
- indefinite integration
- rules of integration
- Fundamental Theorem of Calculus

Lens: Change

G

#### Generalizations / Enduring Understandings

Strand 1: Definite Integration

Concepts:

- Riemann Sum
- definite integrals
- area under a curve

Generalization:

A definite integral represents the area under a curve over a given interval.

Riemann sums use geometric and numerical methods to approximate definite integrals.

Strand 2: Indefinite Integration

Concepts:

#### Guiding Questions

*Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]*

Factual:

What is a definite integral? (S1)

What does the area of the region between the graph of a rate of change function and the x-axis represent? (S1)

What is the difference between areas above and areas below the x-axis? (S1)

What is a Riemann sum? (S1)

What is the Fundamental Theorem of Calculus? (S2)

What is the difference between differentiation and integration? (S2)

What is the difference between indefinite and definite integrals? (S2)

What patterns indicate the need for integration using substitution? (S2)

What does it mean for a sum to diverge? (S2)

<ul style="list-style-type: none"> <li>• indefinite integration</li> <li>• rules of integration</li> <li>• Fundamental Theorem of Calculus</li> </ul> <p>Generalization: Indefinite Integration is the inverse of differentiation. Mathematical rules and procedures exist to evaluate the integral of different types of functions. The Fundamental Theorem of Calculus connects differentiation and integration.</p>	<p><u>Conceptual:</u> Given information about a rate of change, how can we determine the net change over a given interval of time? (S1) How can definite integrals be approximated using geometric and numerical methods? (S2) When is it appropriate to use geometry to evaluate an integral? (S2) Given information on velocity, how can the Fundamental Theorem of Calculus be used to determine position? (S2) How is integrating to find areas related to differentiating to find slopes?(S2) How can rearranging function into equivalent forms allow us to find anti-derivatives efficiently? (S2)</p> <p><u>Provocative:</u> How is it possible for the area of an unbounded region to be finite? (S2)</p>
<p>Standard(s) <i>Connecticut Core Standards / Content Standards</i> <u>Calculus Standards</u></p>	
<p>Critical Content &amp; Skills <i>What students must <b>KNOW and be able to DO</b></i> Students will be able to</p> <ul style="list-style-type: none"> <li>• Apply the Properties of Integrals</li> <li>• Apply Riemann Sums</li> <li>• Apply the Fundamental Theorem of Calculus</li> </ul>	
<p>Core Learning Activities Apply Riemann Sums</p> <ul style="list-style-type: none"> <li>• Approximate areas under a curve using the sum of areas of basic geometric shapes.</li> <li>• Interpret the limiting case of the Riemann sum as a definite integral.</li> <li>• Represent the limiting case of the Riemann sum as a definite integral.</li> </ul> <p>Apply the Fundamental Theorem of Calculus</p> <ul style="list-style-type: none"> <li>• Connect the area under the graph of a functions derivative with the net change in the function.</li> <li>• Solve Problems related to the motion of a particle along a line.</li> </ul> <p>Apply the Properties of Integrals</p> <ul style="list-style-type: none"> <li>• Apply basic integration rules to find the integral of a function.</li> <li>• Use the inverse process of differentiation to find the antiderivative of functions.</li> </ul>	
<p>Assessments <u>Exam Sample Questions</u></p>	<p>Resources <i>Professional &amp; Student</i> AP Classroom Department developed materials online resources</p>
<p>Student Learning Expectation &amp; 21st Century Skills</p>	<p>Interdisciplinary Connections</p>

Information Literacy  
Critical Thinking  
Spoken Communication  
Written Performance

Economics - If compounding more often increases the amount in an account with a given rate of return and term, why doesn't compounding continuously result in an infinite account balance, all other things being equal?  
Physics - Particle Motion

# Unit Planner: Applications of Integration

## AP Calculus B/C

Updated: November 10, 2022, 3:42PM

Newtown High

School /

2022-2023 /

Grade 12 /

Mathematics / Last Updated: [Tuesday, June 28, 2022](#) by Paige Hyman

AP Calculus B/C

(College Board

AP) / Week 16 -

Week 19

### Applications of Integration

Cavataro, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Keristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

*Please attach your completed Unit Web Template here*

Concept: Applications of Integration

- integral defined function
- The Second Fundamental Theorem of Calculus
- average value of a function
- area between two curves
- volume of solids

Lens: transformation

G

#### Generalizations / Enduring Understandings

Strand 1: Real World Applications

Concepts:

- integral defined function
- The Second Fundamental Theorem of Calculus
- average value of a function

Generalization:

The Second Fundamental Theorem of Calculus gives an equation for the derivative of an integral defined function. The average value of a function is solved by definite integrals.

Strand 2: Area and Volume Applications

Concepts:

- area between two curves
- volume of solids

Generalization:

#### Guiding Questions

*Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]*

Factual:

What is the average value of a function? (S1)  
How do position, velocity, and acceleration relate? (S1)  
What are the methods to calculate volume of solids? (S2)

Conceptual:

How can differentiation and antidifferentiation help to move between position, velocity, and acceleration functions? (S1)  
When should each method to calculate volume of solids be used? (S2)

Provocative:

Is the same solution achieved when finding the volume of a three dimensional figure using different methods? (S2)  
How can integration be used to explain that the formulas for areas of two dimensional geometric figures relate to the volume of their three dimensional counterparts? (S2)

<p>Definite integrals solve for areas between two curves and volumes of solids.</p>	<p>If the width of a rectangle is infinitesimally small is it still two dimensional? (S2)</p>
<p><b>Standard(s)</b>  <i>Connecticut Core Standards / Content Standards</i>  <u>Calculus Standards</u></p>	
<p><b>Critical Content &amp; Skills</b>  <i>What students must <b>KNOW and be able to DO</b></i>  Students will be able to:</p> <ul style="list-style-type: none"> <li>• Apply the Second Fundamental Theorem of Calculus in Real World problems</li> <li>• Use integrals to solve for area under a curve and volume of solids</li> </ul>	
<p><b>Core Learning Activities</b>  Apply the Second Fundamental Theorem of Calculus in Real World problems</p> <ul style="list-style-type: none"> <li>• determine the average value of a function using definite integrals</li> <li>• determine values for positions and rates of change using definite integrals in problems involving rectilinear motions</li> <li>• calculate areas in the plane using the definite integral</li> </ul> <p>Use integrals to solve for area under a curve and volume of solids</p> <ul style="list-style-type: none"> <li>• calculate volumes of solids with known cross sections using definite integrals</li> <li>• calculate volumes of solids of revolution using definite integrals</li> <li>• determine the length of a curve in the plane defined by a function, using a definite integral</li> </ul>	
<p><b>Assessments</b>  <u>Sample Exam Questions</u></p>	<p><b>Resources</b>  <i>Professional &amp; Student</i>  AP Classroom  Department developed materials  online resources</p>
<p><b>Student Learning Expectation &amp; 21st Century Skills</b>  <u>Information Literacy</u>  <u>Critical Thinking</u>  <u>Spoken Communication</u>  <u>Written Performance</u></p>	<p><b>Interdisciplinary Connections</b>  Physics- particle motion</p>

# Unit Planner: Differential Equations

## AP Calculus B/C

Thursday, November 10, 2022, 3:49PM

Newtown High  
School /  
2022-2023 /  
Grade 12 /

Mathematics / Last Updated: [Tuesday, June 28, 2022](#) by Paige Hyman  
AP Calculus B/C  
(College Board  
AP) / Week 20 -  
Week 23

### Differential Equations

Cavataro, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Keristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

*Please attach your completed Unit Web Template here*

Concept: Different Equations

- differential equations
- slope fields
- general solution
- particular solution
- exponential growth and decay
- gravity

Lens: Analysis

#### G Generalizations / Enduring Understandings

Strand 1: Differential Equations

Concepts:

- differential equations
- slope fields
- general solution
- particular solution

Generalization:

A differential equation is the derivative of a family of functions.

A slope fields represents all possible general solutions to a differential equation.

The particular solution to a differential equation is a unique solution based on a given initial condition.

Strand 2: Applications of Differential Equations

Concepts:

#### Guiding Questions

*Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]*

Factual:

What is the difference between a general solution and a particular solution? (S1)

What is a slope field? (S1)

What is the difference between exponential growth and decay? (S1)

What is the gravitational constant? (S2)

Conceptual:

How can you identify the behavior of a particular solution using a slope field? (S1)

How is the particular solution graphed on a slope field? (S1)  
How do the general solutions of a differential equation vary? (S1)

How are differential equations used to model exponential growth and decay? (S2)

How are differential equations used to model acceleration due to gravity? (S2)



<ul style="list-style-type: none"> <li>• exponential growth and decay</li> <li>• gravity</li> </ul> <p>Generalization: Exponential growth and decay and acceleration due to gravity can be modeled using differential equations.</p>	<p><u>Provocative:</u> Can a model be derived for the number of computers, <math>C</math>, infected by a virus, given a model for how fast the computers are being infected, <math>dC/dt</math>, at a particular time? (S1)</p>
<p><b>Standard(s)</b> <i>Connecticut Core Standards / Content Standards</i> <u>Calculus Standards</u></p>	
<p><b>Critical Content &amp; Skills</b> <i>What students must <b>KNOW and be able to DO</b></i> Students will be able to:</p> <ul style="list-style-type: none"> <li>• Solve differential equations</li> <li>• Apply differential equations</li> </ul>	
<p><b>Core Learning Activities</b> Solve differential equations</p> <ul style="list-style-type: none"> <li>• Interpret verbal statements of problems as differential equations involving a derivative expression</li> <li>• Verify solutions to a differential equation</li> <li>• Estimate solutions to differential equations</li> <li>• Determine general solutions to differential equations</li> <li>• Determine particular solutions to differential equations</li> </ul> <p>Apply differential equations</p> <ul style="list-style-type: none"> <li>• Interpret the meaning of a differential equation and its variables in context</li> <li>• Determine general and particular solutions for problems involving differential equations in context</li> </ul>	
<p><b>Assessments</b> <u>Exam Sample Question</u></p>	<p><b>Resources</b> <i>Professional &amp; Student</i> AP Classroom Department developed materials online resources</p>
<p><b>Student Learning Expectation &amp; 21st Century Skills</b> <u>Information Literacy</u> <u>Critical Thinking</u> <u>Spoken Communication</u> <u>Written Performance</u></p>	<p><b>Interdisciplinary Connections</b> Physics - Particle motion Economics - Exponential growth and decay</p>

# Unit Planner: Parametric, Polar, and Vector-Valued Functions

## AP Calculus B/C

Thursday, November 10, 2022, 8:50PM

Newtown High

School /

2022-2023 /

Grade 12 /

Mathematics / Last Updated: [Tuesday, June 28, 2022](#) by Megan Guarino

AP Calculus B/C

(College Board

AP) / Week 24 -

Week 27

### Parametric, Polar, and Vector-Valued Functions

Cavataro, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Kristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

Please attach your completed Unit Web Template here

Concept: Parametric, Polar, and Vector-Valued Functions

- real-valued function
- parametric equation
- vector-valued functions
- arc length
- polar coordinates
- polar equation
- area between polar curves

Lens: function

G

#### Generalizations / Enduring Understandings

Strand 1: Parametric Equations and Vector Valued

Functions

Concepts:

- real-valued function
- parametric equation
- vector-valued functions
- arc length

Generalization:

Methods for calculating derivatives and integrals of real valued functions are extended to parametric and vector valued functions.

The arc length of a parametrically defined curve is calculated using a definite integral.

Strand 2: Polar Coordinates

#### Guiding Questions

Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]

Factual:

- What is a parametric equation? (S1)
- What is a tangent line? (S1)
- What is a vector-valued function? (S1)
- What are polar coordinates? (S2)

Conceptual:

- How can functions be rewritten as parametric functions? (S1)
- How can motion defined parametrically be translated to vector notation? (S1)
- How we model motion not constrained to a linear path? (S2)
- How does the chain rule help us to analyze graphs defined using parametric equation or polar functions? (S1)
- How is the concept of calculating areas in rectangular coordinates extended to polar coordinates? (S2)

<p>Concepts:</p> <ul style="list-style-type: none"> <li>• polar coordinates</li> <li>• polar equation</li> <li>• area between polar curves</li> </ul> <p>Generalization:  Methods for calculating derivatives and integrals of real valued functions is extended to functions in polar coordinates.  The area between two polar curves is calculated using definite integrals.</p>	<p>Provocative:  Can polar, parametric, and vector valued functions allow us to extend our knowledge to other applications? (S1/S2)</p>
<p>Standard(s)  <i>Connecticut Core Standards / Content Standards</i></p>	
<p>Critical Content &amp; Skills  <i>What students must KNOW and be able to DO</i>  Students will be able to:</p> <ul style="list-style-type: none"> <li>• Apply methods for calculating derivatives of real-valued functions to parametric functions and polar curves</li> <li>• Use definite integrals to determine regions defined by parametric functions and polar curves</li> <li>• Determine values for positions and rates of change in problems involving planar motion</li> </ul>	
<p>Core Learning Activities</p> <p>Apply methods for calculating derivatives of real-valued functions to parametric functions and polar curves</p> <ul style="list-style-type: none"> <li>• Calculate derivatives of parametric functions</li> <li>• Calculate derivatives of vector-valued functions</li> <li>• Calculate derivatives of functions written in polar coordinates</li> </ul> <p>Use definite integrals to determine regions defined by parametric functions and polar curves</p> <ul style="list-style-type: none"> <li>• Determine the length of a curve in the plane defined by parametric functions</li> <li>• Calculate areas of regions defined by polar curves using definite integrals</li> <li>• Determine a particular solution given a rate vector and initial conditions</li> </ul> <p>Determine values for positions and rates of change in problems involving planar motion</p> <ul style="list-style-type: none"> <li>• Derivatives can be used to determine velocity, speed, and acceleration for a particle moving along a curve in the plane defined using parametric or vector-valued functions.</li> </ul>	
<p>Assessments</p>	<p>Resources  <i>Professional &amp; Student</i>  AP Classroom  Department developed materials</p>

	online resources
<b>Student Learning Expectation &amp; 21st Century Skills</b> <u>Information Literacy</u> <u>Critical Thinking</u> <u>Spoken Communication</u> <u>Written Performance</u>	<b>Interdisciplinary Connections</b>

# Unit Planner: Infinite Sequences and Series

## AP Calculus B/C

Thursday, November 20, 2022 3:51PM

Newtown High  
School /  
2022-2023 /  
Grade 12 /

Mathematics / Last Updated: Tuesday, June 28, 2022 by Megan Guarino  
AP Calculus B/C  
(College Board  
AP) / Week 28 -  
Week 32

### Infinite Sequences and Series

Cavataro, Charlotte; Dnes, Danielle; Guarino, Megan; Hall, Eugene; Hyman, Paige; Raccio, Kristen; Tierney, Shawn

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

*Please attach your completed Unit Web Template here*

Concept: Infinite Sequences and Series

- sequence
- series
- convergence tests
- Tangent Line approximation
- Taylor polynomial
- Maclaurin series
- Power Series

Lens: series

G

#### Generalizations / Enduring Understandings

Strand 1: Sequences and Series

Concepts:

- sequence
- series
- convergence tests

Generalizations:

A series is the sum of the terms of an infinite sequence.  
Convergence tests show whether an infinite series converges or diverges.

Strand 2: Taylor, Maclaurin, and Power Series

Concepts:

- Tangent Line approximation
- Taylor polynomial

#### Guiding Questions

*Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]*

Factual:

What is the  $n$ th term test for divergence? (S1)

What is a series? (S1)

What is the difference between absolute or conditional convergence? (S1)

What is the Taylor polynomial approximation of functions? (S2)

What is a power series? (S2)

What is a Taylor series? (S2)

What is a Maclaurin series? (S2)

Conceptual:

How is the  $n$ th term test used to test for divergence of a series? (S1)

How is the integral test used to determine whether a series converges or diverges? (S1)

- Maclaurin series
- Power Series

**Generalization:**

A tangent line approximation is a first degree Taylor polynomial used to approximate the value of a function at a given point

Higher degree Taylor polynomials provide more accurate approximations of the corresponding function.

A Maclaurin series is a Taylor polynomial centered at  $x=0$ .

A power series is a Taylor polynomial with an infinite number of terms.

How does a harmonic series differ from a geometric series? (S1)

How are the comparison test, limit comparison test, alternating series test, and ratio test used to determine whether a series converges or diverges? (S1)

When is a series absolutely convergent, conditionally convergent, or divergent? (S1)

If an alternating series converges by the alternating series test, how is the alternating series error bound used to bound how far a partial sum is from the value of the infinite series? (S2)

How can the Lagrange error bound be used to determine a maximum interval for the error of a Taylor polynomial approximation to a function? (S2)

Provocative:

Can the sum of infinitely many discrete terms be a finite value or represent continuous functions? (S1)

**Standard(s)**

*Connecticut Core Standards / Content Standards*

Calculus standards

**Critical Content & Skills**

*What students must KNOW and be able to DO*

Students will be able to:

- determine whether a series converges or diverges
- approximate the sum of a series
- use series to represent associated functions on an appropriate interval
- determine the error bound associated with a Taylor polynomial approximation
- determine the radius of convergence and interval of convergence for a power series

**Core Learning Activities**

Determine whether a series converges or diverges

- define convergent and divergent series
- use geometric series
- apply the  $n$ th term test for divergence
- apply the integral test for convergence
- use Harmonic series
- use  $p$ -series
- apply comparison tests for convergence
- apply alternating series test for convergence
- apply ratio test for convergence
- determine absolute or conditional convergence

Approximate the sum of a series

- alternating series error bound

Use series to represent associated functions on an appropriate interval

- represent a function at a point as a Taylor polynomial
- approximate function values using a Taylor Polynomial

- represent a function as a Taylor series
- represent a function as a Maclaurin series
- represent a function as a power series
- Interpret Taylor series or Maclaurin series

Determine the error bound associated with a Taylor polynomial approximation

- Lagrange error bound
- alternating series error bound

Determine the radius of convergence and interval of convergence for a power series

#### Assessments

[Sample exam questions](#)

#### Resources

*Professional & Student*

AP Classroom

Department developed materials

[online resources](#)

#### Student Learning Expectation & 21st Century Skills

[Information Literacy](#)

[Critical Thinking](#)

[Spoken Communication](#)

[Written Performance](#)

#### Interdisciplinary Connections

Taylor series have wide reaching applications across mathematics, physics, engineering and other sciences. The concept of approximating a function, or data, using a series of functions is a fundamental tool of modern science.



# *Newtown Public Schools Special Education*

Deborah Petersen - *Director of Pupil Personnel/Special Education*

Sonia Raquel - *Supervisor of Elementary Special Education, PK*

Maureen Hall - *Supervisor of Intermediate Special Education, G6 5*

Dr. Paula Grayson - *Supervisor of Secondary Special Education,*

*Gr. 9-12 - ages 18-22*



*Newtown Public Schools currently has  
students who require Specialized Instruction  
(December 2, 2022)*

**677**



# Integrated Preschool Program



- ★ Housed at Head O' Meadow Elementary School (2022-23 school year)
- ★ 3 Integrated Preschool Classrooms
- ★ 1 Preschool classroom that services students with significant medical, behavioral, and or academic needs.
- ★ **District BCBA** oversees program
- ★ 2 SLP's provide services to Preschool (2 housed at Preschool Program)
- ★ .5 SLP for Kindergarten eligible Speech/Language students only. Services provided at student's home elementary school.
- ★ SLP's also consult with area private preschool programs and daycares.



# PAL - Program for Adaptive Learning

- ★ Housed at Middle Gate Elementary School
- ★ The PAL program is designed to meet the individual needs of students who display significant delays in academic, social, cognitive, adaptive and communication functioning.
- ★ Supported by a Special Education teacher, BCBA and adult support/Behavior Therapists.
- ★ Regular consult with related service providers, specialists and classroom teachers to promote generalization in the inclusive setting.

# SEAL - Social Emotional Adjustment Learning

Housed at Hawley Elementary School (Sandy Hook for 2022-23 school year)

Provides a small group and/or individual instruction to students who struggle to succeed in the mainstream due to behavioral and/or social/emotional issues.

Supported by a Special Education Teacher, BCBA, RBT(registered behavioral technician), School Psychologist and adult supports.

Students range in cognitive abilities from Low Average, Average and High Average.

Instruction is individually based, however, the elementary curriculum is utilized to assist with the goal of the students attending and transitioning into the general education setting.

# RISE-Reaching Independence through Structured Education



- ★ *Housed at Newtown Middle School*
- ★ *Program for students with Intellectual Disabilities and/or autism, multiple disabilities, or significant learning disabilities who require individualized instruction, functional academics and/or vocational experiences.*
- ★ *Pre-teaching of academic, social, communication and behavioral skills.*
- ★ *Community experiences (grocery shopping for weekly functional cooking activity, etc)*
- ★ *Integration into general education/specials as outlined in the student's IEP*
- ★ *Cool Beans Coffee cart*

# Tools For Living



- ★ Tools for Living provides opportunities for students from general education to mentor and tutor their peers with disabilities on activities of daily living and life skills
- ★ General education and special education students receive credit for the course
- ★ Special education students learn functional academics which provide them the skills needed when working in the community
- ★ Provides vocational experiences



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# *SAIL -Supportive Alternative Individualized Learning*



- 
- ★ Housed at both Newtown Middle School and Newtown High School
  - ★ A specialized program for students who have not been successful in the traditional school setting due to, but not limited to, the following:
    - Social, emotional, behavioral needs
    - School refusal
    - Attendance issues
    - Need for flexible, hands-on learning environment
    - Need for enhanced academic support in an environment with a small student to teacher ratio.

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# ***SAIL***

## ***continued...***



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### Staffing:

- Special Education Teacher
- Social Worker
- Full-time Paraprofessional (NHS)
- BCBA (consult and services)
- Related service staff (School Psychologist, OT, PT, SLP)
- General Education Teachers for Co-Teaching



# NCP - Newtown Community Partnership Traditional and Hybrid Program

- ★ NCP is Newtown Public Schools 1822 Vocational Program
- ★ Main classroom is housed at Newtown Middle School in a separate location away from Middle School Students (separate entrance and exit)
- ★ NCP transports students with purchased vans solely for program.
- ★ Program is designed to provide vocational experiences in a variety of settings (i.e. Booth Library, PJ's Laundromat, Walgreens, Better Day Cafe, Serve the Seniors at the Senior Center, Central Office, etc.)
- ★ Newtown Public Schools, in collaboration with the Newtown Community Center worked together to create the *Better Day Cafe*
- ★ Cafe was named by NCP students
- ★ NCP facilitates all aspects of the Cafe (baking, finances, marketing, etc)

# NCP continued...



- ★ Students are paid an hourly stipend
- ★ NCP is staff by a Special Education Teacher, Transition Coordinator and Job coaches
- ★ NCP Hybrid- students enrolled in this program attend Naugatuck Community College and take a college class or classes.
- ★ Newtown Public Schools supports 1 college class per semester
- ★ Hybrid students also have the opportunity to participate in vocational experiences.



**2021-2022**

Students Quarantined who  
received services: 27

Staff Tutoring Virtually: 3

# 2021-2022 PPT's

Number:

1,712

District filed for 2 Due Process  
hearings to defend evaluations

# Specialized Reading Instructors

2021-2022

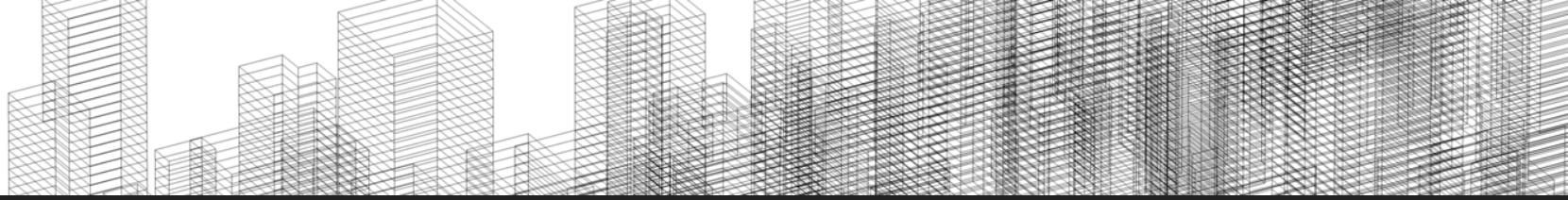
Certified Wilson Instructors

8

Orton/Gillingham 30 hrs and/or Level 2

8





## 2021-2022 CHALLENGES

- Paraprofessionals (12)
- Bus Drivers refusing to transport special education students
- Special Education Teachers for ESY(6)



# Greenery (1 & 2)

2 Curriculum Developers | Last Updated: Monday, Oct 31, 2022 by Mullen, Shawn

## Unit Calendar by Year

Unit	Au	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Ju																											
Lessons	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Plant Culture	0																																					
Plant Science	0																																					
Plant Classification	0																																					
Composting & Soil Food Web	0																																					
Enterprise Practices & Career...	0																																					



5 Units found



# Unit Planner: Plant Culture Greenery (1 & 2)

Newtown High School / 2022-2023 / High School / BEAT/Science / Greenery (1 & 2) / Week 1 - Week 18 Last Updated: Monday, October 31, 2022  
by Shawn Mullen

## Plant Culture

Mullen, Shawn; Stamm, Anastasia

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

Please attach your completed Unit Web Template here

Lens: Interdependence

Concepts: Germination, Propagation, Integrated Pest Management, Wholesale Plug Production, Nursery & Farm Productivity, Plants, Environment

**G**  
Generalizations /  
Enduring Understandings

1. Germination initiates the process of seeds developing into new plants.
2. Propagation produces a new plant from an existing one.
3. An environment must be optimized in order to support healthy growth and sustained life

#### Guiding Questions

*Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]*

##### FACTUAL

What is Germination? (G1)

What is Propagation? (G2, G6)

What is Integrated Pest Management? (G3, G5)

##### CONCEPTUAL

How does germination initiate the process of seeds developing into new plants? (G1)

How does propagation produce a new plant from an existing one? (G2, G6)

How can wholesale plug production drive nursery & farm productivity? (G4)

How does Integrated Pest Management relate to a balanced ecosystem? (G3, G5)

In what ways can propagation be used to increase greenhouse/farm productivity? (G6)

##### PROVOCATIVE

Is Integrated Pest Management necessary for maintaining a healthy growing environment? (G3, G5)

Should greenhouses & farms allow the public to propagate their plants? (G2, G6)



in plants.

4. Wholesale plug production drives nursery and farm productivity.

5. Integrated Pest Management practices create a balanced ecosystem in the greenhouse and on the farm.

6. Propagation stimulates greenhouse and farm productivity.

## Standard(s)

*Connecticut Core Standards / Content Standards*

**NGSS: Science Performance Expectations (2017)**

**NGSS: HS Life Sciences**

### **HS.Structure and Function Performance Expectations**

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

### **HS.Matter and Energy in Organisms and Ecosystems Performance Expectations**

HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

### **HS.Interdependent Relationships in Ecosystems Performance Expectations**

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.\*

HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on

biodiversity.\*

## **HS.Inheritance and Variation of Traits**

### **Performance Expectations**

HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

## **NGSS: Disciplinary Core Ideas**

### **NGSS: 9-12**

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#### **LS1: From Molecules to Organisms: Structures and Processes**

##### **LS1.A: Structure and Function**

Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

##### **LS1.C: Organization for Matter and Energy Flow in Organisms**

The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen. (HS-LS1-5)

## **CT: ASTE-Agricultural Science and Technology Education Standards 2014**

### **Grades 9-12**

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#### **Agriculture, Food, and Natural Resources Foundation Skills**

##### **CT-FS.06. Performance Element: Utilize and maintain tools used in AFNR.**

CT-FS.06.01. Performance Indicator: Evaluate and select the appropriate tool to perform a given task

CT-FS.06.03. Performance Indicator: Maintain tools for efficient use.

#### **Natural Resources Systems**

**Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and techniques to the management of natural resources.**

**CT-NRS.01. Performance Element: Explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.**

CT-NRS.04.01. Performance Indicator: Diagnose plant and wildlife diseases and follow protocol to prevent their spread

CT-NRS.04.02. Performance Indicator: Manage insect infestations of natural resources.

#### **Plant Science**

**Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and techniques to the production and management of plants**

CT-PS.02.02. Performance Indicator: Evaluate soil/media and prepare soil/growth media for use in plant systems

**CT-PS.03. Performance Element: Propagate culture and harvest plants.**

CT-PS.03.01. Performance Indicator: Demonstrate plant propagation techniques.

PS.03.02. Performance Indicator: Develop and implement a plant management plan for crop production.

CT-PS.03.03. Performance Indicator: Develop and implement a plan for integrated pest management

CT-PS.03.04. Performance Indicator: Apply principles and practices of various plant production methods to meet the needs of the market.

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 Access the interactive version of the NGSS [here](#)

### Critical Content & Skills

What students must **KNOW** and be able to **DO**

<u>Topic</u>	<u>Content</u>	<u>Skills</u>
Seeds	(What students must know in order to demonstrate Skills) <b>Explain</b> Germination: Dormancy, Moisture, Temperature, Light, Aeration <b>Describe</b> Seed Anatomy: Seed Coat, Cotyledon, Epicotyl, Hypocotyl, Radicle, Embryo	Seed Starting
	<b>Identify</b> Plant Parts: Primary Roots, Tap Roots, Root Hairs, Shoots, Stems, Lateral Bud, Terminal Bud, Apical Bud, Leaves	Propagate Successfully
	<b>Recognize</b> Flower Anatomy & Physiology: Stamen, Pistil, Stigma, Anther, Style, Ovary, Sepal, Petal	Cross Pollinate Plants
	<b>Classify</b> Plant Tissues: Parenchyma, Collenchyma, Sclerenchyma, Permanent/Meristematic, Ground Tissue, Vascular Tissue, Dermal Tissue	Hybridization of Plants
Propagation/Cutting	<b>Manage</b> Garden & Greenhouse Environmental Factors: Moisture, Temperature, Lighting, Aeration	Implement Safety Practices
	<b>Utilize</b> Safety Practices: Goggles, Gloves, Blades	Observe Environmental Factors
	<b>Demonstrate</b> Propagation Techniques for Various Plants: Layering, Root Divisions, Asexual Reproduction, Grafting, Optimal Moisture, Optimal Temperature	Maintain Environmental Factors
	<b>Demonstrate</b> use of Propagation Tools & Equipment: Scalpel, Root Hormone, Pruners	Manage Tools & Equipment
	<b>Utilize</b> Cross Pollination Techniques for Various Plants	Transplanting Practices
Plugs/Liners	<b>Utilize</b> Hybridization Techniques for Various Plants	Preparing Soil Mediums
	<b>Utilize</b> Transplanting Techniques	Selecting Appropriate Soil Mediums
	<b>Identify</b> Soil Mediums: Clay, Silt, Sand, Humus, Drainage, Water retention, Aeration, Soil-less Mediums, Rockwool, Perlite, Vermiculite, Peet Moss, Coco Coir, Expanded Clay Pellets	
	<b>Demonstrate</b> Plug/Liner Production/Process: Vacuum Plug Trays, Wholesale Production, Differences between Plugs & Liners (Seed Grown Juvenile Plants vs Propagated Juvenile Plants), Ebb & Flow	

Watering

**Understand** Connections Between Insects/Fungi/Bacteria for Prevention & Control of Pests

**Describe** Role of Insects: Beneficial Insects, Parasitic Insects, Plant/Insect Relationships

**Describe** Role of Fungi: Beneficial Fungi, Parasitic Fungi, Plant/Fungi Relationships

**Describe** Role of Bacteria (microbes): Beneficial Bacteria, Parasitic Bacteria, Plant/Bacterial Relationships

**Identify** Life Cycles of Pests: Egg, Larva, Pupa, Adult

**Identify** Natural Enemies (different pests have different enemies): Predator, Prey, Parasite

Monitor/Diagnose/Treat:

Prevention of Pests

Observation of Pests

Intervention of Pests

Evaluation of Pests

Develop Treatment Plan 4 Pests

IPM (Integrated Pest Management)

## Core Learning Activities

Seed Germination [Gizmo](#)

Germination [Gizmo](#)

Propagation of Plants [Notes](#)

Propagation of Plants [Worksheet](#)

Propagation of Plants [Crossword](#)

Propagation of Plants [Quiz](#)

IPM (Integrated Pest Management) [Notes](#)

IPM (Integrated Pest Management) [Worksheet](#)

IPM (Integrated Pest Management) [Crossword](#)

IPM (Integrated Pest Management) [Quiz](#)

- Scented Geranium Cuttings
- Banana Root Divisions
- Seed Starting (Germination)
- Preparing & Planting Plug Trays
- Practicing Integrated Pest Management
- Grafting Tomatoes
- Air Layering Fig Plants

- Plant Profiles (Research Project)

## Assessments

**Planting Plugs/Liners Summative: Lab Assignment**  
Planting Rubric

## Resources

*Professional & Student*

### Propagation

\*\* California Rare Fruit Growers - Plant Propagation Chart, Claude Sweet

<http://www.crfg.org/tidbits/protable.html>

\*\* Carolina Biological Supply Company

Possible source for tissue culture kit

<https://www.carolina.com/>

\*\* Fisher Science Education

<https://www.fishersci.com/us/en/education-products.html?LBCID=28393576&href=index.jsp&store=ScienceEducation&segment=scienceEduStandard&storeId=10652>

\*\* Food and Agriculture Organization (FAO) - Plant Tissue Culture: An Alternative for Production of Useful Metabolite

<http://www.fao.org/docrep/t0831e/t0831e00.htm>

\*\* Home Harvest Garden Supply - Plant Propagation

<http://plantpropagation.com/>

\*\* Kitchen Culture Kits

This site concerns tissue culture kits for "classroom and home."

<http://www.kitchenculturekit.com/>

\*\* North Carolina Cooperative Extension - Plant Propagation by Stem Cuttings: Instructions for the Home Gardener

<https://content.ces.ncsu.edu/plant-propagation-by-stem-cuttings-instructions-for-the-home-gardener>

\*\* Ohio State University - Propagating Plants, Part I

<https://plantfacts.osu.edu/movies/abstract.lasso?id=2102a>

\*\* Ohio State University - Propagating Plants, Part II

<https://plantfacts.osu.edu/movies/abstract.lasso?id=2102b>

\*\* Online Biology Book - Cell Division: Meiosis and Sexual Reproduction

<http://www2.estrellamountain.edu/faculty/farabee/biobk/BioBookmeiosis.html>

\*\* Texas A & M University - The Many Dimensions of Plant Tissue Culture Research

<https://aggie-horticulture.tamu.edu/tisscult/pltissue/pltissue.html>

\*\* Texas A & M University - Plant Propagation

<https://aggie-horticulture.tamu.edu/earthkind/landscape/plant-propagation/>

\*\* Texas A & M University - Plant Tissue Culture Information Exchange

<https://aggie-horticulture.tamu.edu/tisscult/tcintro.html>

\*\* University of Arizona - Meiosis Tutorial

[http://www.biology.arizona.edu/CELL\\_BIO/tutorials/meiosis/main.html](http://www.biology.arizona.edu/CELL_BIO/tutorials/meiosis/main.html)

\*\* University of Nebraska - How Is Tissue Culture Done?

<http://passel.unl.edu/pages/informationmodule.php?idinformationmodule=957885612&topicorder=4&>

[maxto=8&minto=1](#)

### **Integrated Pest Management**

**\*\* Entomology Research Laboratory - Greenhouse IPM**

<https://www.uvm.edu/~entlab/Greenhouse%20IPM/UVMGreenhouseIPM.html>

**\*\* Greenhouseipm.org - Integrated Pest Management Basics**

Open each section heading to see detailed information.

<http://greenhouseipm.org/ipm-basics/>

**\*\* Michigan State University - A guide to Greenhouse Sanitation for Growers**

A guide to preparing a greenhouse for a new growing season

[http://www.canr.msu.edu/news/a\\_guide\\_to\\_greenhouse\\_sanitation\\_for\\_growers\\_prepare\\_now\\_sweat\\_less\\_later](http://www.canr.msu.edu/news/a_guide_to_greenhouse_sanitation_for_growers_prepare_now_sweat_less_later)

**\*\* Michigan State University Extension - Integrated Pest Management for Greenhouse Crops**

<https://www.canr.msu.edu/outreach/uploads/files/7-7%20IPM%20factsheet%20JEANNE.pdf>

**\*\* University of California - Best Management Practices for Bedding and Container Color Plant Production in California**

<https://mpparrella.faculty.ucdavis.edu/wp-content/uploads/sites/186/2015/02/Bedding-and-Container-Color-Plant-Best-Management-Practices.pdf>

**\*\* University of Connecticut - Greenhouse Integrated Pest Management**

<http://ipm.uconn.edu/documents/view.php?id=1095>

**\*\* University of Massachusetts Extension - IPM Scouting and Decision Making**

<https://ag.umass.edu/greenhouse-floriculture/fact-sheets/ipm-scouting-decision-making>

**\*\* Utah State University Extension - IPM for Greenhouse and Nursery Crops**

This is a PowerPoint presentation with many photographs.

<https://utahpests.usu.edu/slideshows/ppt/10sh-IPM-greenhouse.pdf>

**Student Learning Expectation & 21st Century Skills**

Information Literacy  
Critical Thinking  
Spoken Communication  
Written Performance

### **Interdisciplinary Connections**

Biology

Botany

Chemistry

Ecology

Environmental Science

Geology

Language Arts

Personal Financial Literacy

Business Foundations

Digital Media & Communications

Fine Arts



# Unit Planner: Plant Science Greenery (1 & 2)

Unit Plan, 2022-2023

Newtown High School / 2022-2023 / High School / BEAT/Science / Greenery (1 & 2) / Week 1 - Week 18

Last Updated: Monday, October 31, 2022  
by Shawn Mullen

## Plant Science

Mullen, Shawn; Stamm, Anastasia

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

Please attach your completed Unit Web Template here

Lens: Structure/Function

Concepts: Dormancy, Hardiness, Pollination, Photosynthesis, Ecosystems

G	Guiding Questions
Generalizations / Enduring Understandings	<i>Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]</i>
1. Hardiness determines the environment a plant can survive in.	<p><b>FACTUAL</b></p> <p>What is pollination? (G3, G5)</p> <p>What is dormancy? (G2, G5)</p> <p>What determines hardiness? (G1, G5)</p> <p>What is photosynthesis? (G4, G5)</p> <p>What is an ecosystem? (G4)</p>
2. Dormancy functions to protect plants from harsh environments.	<p><b>CONCEPTUAL</b></p> <p>What structural systems play specific roles in the function &amp; health of plants? (G5)</p> <p>What function do pollinators serve to ensure survival of plant species? (G3, G5)</p>
3. Pollination ensures the survival of a plant species.	<p>How does photosynthesis drive the ecosystem of our plant? (G4)</p> <p><b>PROVOCATIVE</b></p> <p>How might our ecosystem function if photosynthesis didn't happen? (G4)</p> <p>What is the best way to protect native pollinators? (G3, G5)</p>
4. Photosynthesis drives the ecosystem	



of our planet.

5. Structural systems play specific roles in the function and health of a plant to promote growth, survival, and reproduction

## Standard(s)

*Connecticut Core Standards / Content Standards*

**NGSS: Science Performance Expectations (2017)**

**NGSS: HS Life Sciences**

### **HS.Structure and Function**

#### **Performance Expectations**

HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

### **HS.Matter and Energy in Organisms and Ecosystems**

#### **Performance Expectations**

HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

### **HS.Inheritance and Variation of Traits**

#### **Performance Expectations**

HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

**CT: ASTE-Agricultural Science and Technology Education Standards 2014**

**Grades 9-12**

**Agriculture, Food, and Natural Resources Foundation Skills**

**Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and practices to all areas of agriculture**

**CT-FS.01. Performance Element: Examine the importance of health, s management systems in organizations and their importance to performance and regulatory safety, and environmental compliance.**

CT-FS.01.01. Performance Indicator: Safety with Contaminants and Equipment: Understand the concepts and procedures of handling contaminants, chemicals and related equipment in an agricultural setting.

**CT-FS.02. Performance Element: Career Success: Demonstrate those qualities, attributes and skills necessary to succeedin, or further prepare for, a chosen career.**

CT-FS.02.01. Performance Indicator: Understand the use and application of information-based technologies necessary for career success in agriculture

**Plant Science**

**Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and techniques to the production and management of plants**

CT-PS.01.02. Performance Indicator: Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.

CT-PS.01.03. Performance Indicator: Apply knowledge of plant physiology and energy conversion to plant systems

CT-PS.02.01. Performance Indicator: Determine the influence of environmental factors on plant growth.

CT-PS.02.03. Performance Indicator: Develop and implement a fertilization plan for specific plants or crops.

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 Access the interactive version of the NGSS [here](#)

**Critical Content & Skills**

*What students must **KNOW** and be able to **DO***

<u>Topic</u>	<u>Content</u>	<u>Skills</u>
	(What students must know in order to demonstrate Skills)	
Plant Groups: Clades, Monocot/Dicot, Flowering/Non-Flowering, Vascular/Non-Vascular	<b>Differentiate</b> between Clade Types  <b>Analyze</b> Cladogram Maps	<b>Create</b> Cladogram Maps  <b>Identify</b> Monocot/Dicot, Flowering/Non-Flowering,

	<b>Compare</b> the functions of Monocot/Dicot Organisms	Vascular/Non-Vascular
	<b>Compare</b> the functions of Flowering/Non-Flowering Organisms	<b>Categorize</b> Monocot/Dicot, Flowering/Non-Flowering, Vascular/Non-Vascular
	<b>Compare</b> the functions of Vascular/Non-Vascular Organisms	<b>Diagram</b> Monocot/Dicot, Flowering/Non-Flowering, Vascular/Non-Vascular
	<b>Identify</b> Plant Structures: Shoots, Roots, Leaves, Flowers, Seeds, Nodes	<b>Utilize Microscopy to Diagram:</b> Tissue Types, Cell Types, Cell Anatomy, Plant/Cell Organelles, etc
Plant Parts: Tissue Types, Dormancy, Hardiness	<b>Examine</b> Plant Tissues: Parenchyma, Collenchyma, Sclerenchyma, Permanent/Meristematic, Ground Tissue, Vascular Tissue, Dermal Tissue	<b>Identify &amp; Label</b> Plant Parts, Tissue Types, Cell Types, Cell Anatomy, Plant/Cell Organelles, etc
	<b>Interpret</b> Dormancy functions: Hibernation, Weather/Climate, Drought	
	<b>Classify</b> Hardiness: Global Plant Hardiness Zones	
	<b>Explain</b> the function of Germination: Dormancy, Moisture, Temperature, Light, Aeration	<b>Identify</b> Plant Life Cycle Stages
	<b>Describe</b> Seed structure & anatomy: Seed Coat, Cotyledon, Epicotyl, Hypocotyl, Radicle, Embryo	<b>Diagram</b> Plant Life Cycle Stages
Plant Life Cycles	<b>Describe</b> Pollination: Flower, Pollen, Indigenous, Symbiosis, Pesticides	<b>Manipulate</b> Plant Life Cycle Stages
	<b>Discuss</b> Pollinators: Insects, Mammals, Wind, Rain, Manual (Humans)	
	<b>Survey</b> Generation structure: Meiosis, Hybridization, Seed Saving Practices, Fertilization, Spore, Sporophyte, Sporangium, Gametophyte, Haploid, Diploid	
	<b>Summarize</b> the function of Photosynthesis: Sunlight, Catalyst, Carbon Dioxide, Water, Glucose, Oxygen, Photons, Chloroplast, Chlorophyll	<b>Diagram</b> Process of Photosynthesis
	<b>Identify</b> the function of Micro/Macro Nutrients & <b>Indicate</b> the function of Necessary Elements & Minerals: Nitrogen, Phosphorus, Potassium, Calcium, Sulfur, Magnesium, Iron, Manganese, Copper, Zinc, Boron, Chloride, Molybdenum	<b>Test</b> for Micro/Macro Nutrient Levels
Plant Nutrition	<b>Recognize</b> Nutrient Deficiencies: Overwatering, Compacted Soil, Uptake, PH, Air Flow, Soil Consistency, Organic Materials	<b>Diagnose &amp; Treat</b> Nutrient Deficiencies
		<b>Survey</b> Elements & Minerals in Garden
		<b>Feed &amp; Maintain</b> Various Plants in the Garden & Greenhouse

## Core Learning Activities

Microscope practice [Virtual Microscope Lab](#)

ID and Label plant parts, flower anatomy, and life cycles

Purpose games Students race to label various diagrams

From seed to fruit Label the life cycle

Photosynthesis lab (elodea) Elodea Photosynthesis Lab

Cladograms GIZMO

Essential Nutrients Slideshow

Essential Nutrients Background Information

Essential Nutrients Worksheet

Essential Nutrients Crossword Puzzle

Essential Nutrients Test

Nutrient Deficiencies Notes

Nutrient Deficiencies Worksheet

Nutrient Deficiencies Crossword

Nutrient Deficiencies Quiz

Plant Anatomy Slideshow

Plant Anatomy Background

Plant Anatomy Worksheet

Plant Anatomy Crossword

Plant Anatomy Test

Structure of Plants Slideshow

Structure of Plants Background

Structure of Plants Vocabulary

Structure of Plants VEGETATIVE MORPHOLOGY OF FLOWERING PLANTS

Structure of Plants Worksheet

Structure of Plants Crossword

Structure of Plants Test

<b>Assessments</b>	<b>Resources</b> <i>Professional &amp; Student</i>  * Reed College - Nitrogen Fixation <a href="http://www.reed.edu/biology/Nitrogen/">http://www.reed.edu/biology/Nitrogen/</a>  ** e-Gro webinar - Identification of Nutrient Deficiencies (Greenhouse Plants) 42:19-minute video <a href="https://www.youtube.com/watch?v=Cq9tTqMxh2o">https://www.youtube.com/watch?v=Cq9tTqMxh2o</a>  ** Greenhouse Product News - Diagnosing Bedding Plant Nutrient Deficiencies Includes descriptions and many photos <a href="http://gpnmag.com/wp-content/uploads/diagnosingbeddingplant.pdf">http://gpnmag.com/wp-content/uploads/diagnosingbeddingplant.pdf</a>  ** International Plant Nutrition Institute <a href="http://www.ipni.net/">http://www.ipni.net/</a>  ** Michigan State University Extension - Disease or Disorder: How Do I Tell the Difference? Part 1 Discusses common problems related to nutritional disorders and provides pictures <a href="http://www.canr.msu.edu/news/disease_or_disorder_how_do_i_tell_the_difference_part_1">http://www.canr.msu.edu/news/disease_or_disorder_how_do_i_tell_the_difference_part_1</a>  ** Michigan State University Extension - Six Steps to Identifying Nutrient Deficiencies in Ornamental Plants Includes a plant nutrient deficiency key <a href="http://www.canr.msu.edu/news/six_steps_to_identifying_nutrient_deficiencies_in_ornamental_plants">http://www.canr.msu.edu/news/six_steps_to_identifying_nutrient_deficiencies_in_ornamental_plants</a>  ** North Carolina State University Extension - Managing Micronutrients in the Greenhouse <a href="https://hortscans.ces.ncsu.edu/uploads/m/a/managing_51e6d89fe35b2.pdf">https://hortscans.ces.ncsu.edu/uploads/m/a/managing_51e6d89fe35b2.pdf</a>  ** OFA Association of Floriculture Professionals - Geranium Nutrient Deficiencies: A Visual Primer for Grower Diagnosis & Correction Includes many photographs of various nutrient deficiencies in geraniums <a href="https://www.ars.usda.gov/ARSUserFiles/50820500/Publications/FertilityManagement/OFA%20geranium%20nutrient%20deficiencies.pdf">https://www.ars.usda.gov/ARSUserFiles/50820500/Publications/FertilityManagement/OFA%20geranium%20nutrient%20deficiencies.pdf</a>  ** Promix Training Center <a href="https://www.pthorticulture.com/en/training-center/">https://www.pthorticulture.com/en/training-center/</a>  ** University of Florida - Fertilizer Management for Greenhouse Vegetables <a href="http://edis.ifas.ufl.edu/cv265">http://edis.ifas.ufl.edu/cv265</a>
<b>Student Learning Expectation &amp; 21st Century Skills Information</b>	<b>Interdisciplinary Connections</b>  Biology  Botany

Literacy  
Critical  
Thinking  
Spoken  
Communication  
Written  
Performance

Chemistry

Ecology

Environmental Science

Geology

Language Arts

Personal Financial Literacy

Business Foundations

Digital Media & Communications

Fine Arts



# Unit Planner: Plant Classification Greenery (1 & 2)

Friday, November 4, 2023 10:42 AM

Newtown High School / 2022-2023 / High School / BEAT/Science /  
Greenery (1 & 2) / Week 11 - Week 17

Last Updated: Monday, October 31, 2022 by  
Anastasia Stamm

## Plant Classification

Mullen, Shawn; Stamm, Anastasia

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

#### Unit Web Template (Optional)

#### Concepts / Conceptual Lens

Please attach your completed Unit Web Template here

Lens: Relationship

Concepts: Evolution, Traits, Classification, Hosts, Survival, Indigenous, Invasive, Ecosystems

G

#### Generalizations / Enduring Understandings

1. Evolution impacts traits and relates to plant classification.
2. Hosts maintain survival of another organism.
3. Indigenous populations require similar conditions for survival.
4. Invasive organisms interrupt ecosystems.

#### Guiding Questions

Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]

##### FACTUAL

What is evolution? (G1)

What is a host plant? (G2)

What does it mean when a plant is referred to as indigenous? (G3)

What does it mean when a plant is referred to as invasive? (G4)

What indigenous plants are common in our area? (G3)

What invasive plants negatively effect our area? (G4)

What is binomial nomenclature? (G1)

##### CONCEPTUAL

What does evolution look like in plant species? (G1)

Why are host plants considered keystone species? (G2)

How can we use the Linnaeus Classification system to identify plant species? (G1)

How does the Linnaeus Classification system demonstrate

plant species evolutionary relationships? (G1)

How does variation in traits among plant species impact binomial nomenclature? (G1)

PROVOCATIVE

What species could we plant at NHS to help pollinators mitigate the effects of local construction? (G2, G3)

Can invasive plants interrupt an ecosystem in a positive way? (G4)

## Standard(s)

*Connecticut Core Standards / Content Standards*

**NGSS: Science Performance Expectations (2017)**

**NGSS: HS Life Sciences**

### **HS.Matter and Energy in Organisms and Ecosystems Performance Expectations**

HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

### **HS.Interdependent Relationships in Ecosystems Performance Expectations**

HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.\*

HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.\*

### **HS.Inheritance and Variation of Traits Performance Expectations**

HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.



## HS.Natural Selection and Evolution

### Performance Expectations

HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

## NGSS: Disciplinary Core Ideas

### NGSS: 9-12

#### LS3: Heredity: Inheritance and Variation of Traits

##### LS3.B: Variation of Traits

Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2),(HS-LS3-3)

## CT: ASTE-Agricultural Science and Technology Education Standards 2014

### Grades 9-12

#### Plant Science

**Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and techniques to the production and management of plants**

CT-PS.01.01. Performance Indicator: Classify agricultural plants according to taxonomy systems

CT-PS.01.02. Performance Indicator: Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.

CT-PS.02.01. Performance Indicator: Determine the influence of environmental factors on plant growth.

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Access the interactive version of the NGSS [here](#)

## Critical Content & Skills

*What students must KNOW and be able to DO*

### Content

#### Topic

(What students must know in order to demonstrate Skills)

#### Skills

Indigenous Plants

Locate Host Plants, Indigenous Plants, Invasive Plants, Keystone Species.

Identify Keystone Species within our Local

**Defend** Identification of Host Plants, Indigenous Plants, Invasive Plants.

**Discuss** the relationship of Host Plants, Indigenous Plants, Invasive Plants.

Binomial  
Nomenclature

**Classify** Plants: Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species

Environment

**Map** Host Plants, Indigenous Plants

**Remove** Invasive Plants

**Classify** Plants with the Linnaeus System  
**Name** Plants Utilizing Binomial Nomenclature

**Compare** Characteristics of Plants using Binomial Nomenclature

**Organize** Plant Fruits & Flowers according to Characteristics within the Linnaeus System

## Core Learning Activities

Planting Pollinator Garden

Pollinator [Pathway](#) Site Assessment

Using Native Plants [Notes](#)

Using Native Plants [Worksheet 1](#)

Using Native Plants [Worksheet 2](#)

Using Native Plants [Worksheet 3](#)

Using Native Plants [Worksheet 4](#)

Using Native Plants [Crossword](#)

Using Native Plants [Quiz](#)

Classifying and Naming Plants (Taxonomy) [Notes](#)

Classifying and Naming Plants (Taxonomy) [Worksheet](#)

Classifying and Naming Plants (Taxonomy) [Crossword](#)

Classifying and Naming Plants (Taxonomy) [Quiz](#)

Using Dichotomous Keys [GIZMO](#)

Assessments

Resources

*Professional & Student*

### Using Native Plants

**\*\* Minnesota Department of Natural Resources - Landscaping with Native Plants**

A good example of information provided by a state. Includes landscaping information, plant sources, species listing, etc.  
<https://www.dnr.state.mn.us/gardens/nativeplants/index.html>

**\*\* K-State University - Prairie Flowers: Hardy for Kansas**  
2:12-minute video shows examples of native plants suitable for Kansas.

<https://www.youtube.com/watch?v=Wi8Nq4REB2g>

**\*\* PlantNative - Making a Naturescape Plan**

Choosing native trees, shrubs and herbaceous plants for an urban setting

[http://www.plantnative.org/how\\_plan.htm](http://www.plantnative.org/how_plan.htm)

**\*\* PlantNative - Community Services Directory**

Find national or regional organizations offering information about native plantings.

[http://www.plantnative.org/cs\\_nat\\_reg.htm](http://www.plantnative.org/cs_nat_reg.htm)

**\*\* University of Florida Extension - Native Plants: An Overview**

A fact sheet on how "native" is defined

<http://edis.ifas.ufl.edu/ep297>

**\*\* University of Illinois - Using Native Plants in the Garden**

<https://extension.illinois.edu/downloads/hkmw/45648.pdf>

**\*\* Utah State University Forestry Extension - Are Native Trees Always the Best Choices?**

<https://forestry.usu.edu/trees-cities-towns/tree-selection/native-trees>

**\*\* Wild Ones**

A not-for-profit environmental education group advocating native plants and natural landscapes

<https://wildones.org/>

### **Student Learning Expectation & 21st Century Skills**

Information Literacy

Critical Thinking

Spoken Communication

Written Performance

### **Interdisciplinary Connections**

Biology

Botany

Chemistry

Ecology

Environmental Science

Geology

Language Arts

Personal Financial Literacy

Business Foundations

Digital Media & Communications

Fine Arts



# Unit Planner: Composting & Soil Food Web Greenery (1 & 2)

Friday, November 4, 2023, 1:47 PM

Newtown High School / 2022-2023 / High School / BEAT/Science / Greenery (1 & 2) / Week 1 - Week 10

Last Updated: Monday, October 31, 2022  
by Shawn Mullen

Composting & Soil Food Web  
Mullen, Shawn; Stamm, Anastasia

- [Unit Planner](#)
- [Lesson Planner](#)

## Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

### Concepts / Conceptual Lens

Please attach your completed Unit Web Template here

Lens: Interdependence

Concepts: Soil, Organisms, Plants, Decomposition, Survival, Nutrition, Environment, Ecosystem

G Generalizations / Enduring Understandings	Guiding Questions <i>Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]</i>
1. Soil, a complex living ecosystem, comprises billions of organisms from thousands of species.	<p><b>FACTUAL</b></p> <p>What is the soil food web? (G2)</p> <p>What is decomposition? (G5)</p> <p>What is a healthy ecosystem? (G1, G5)</p> <p>What is PH? (G3)</p> <p>What is moisture? (G3)</p>
2. All plants - grass, trees, shrubs, agricultural crops - depend on the soil food web for their nutrition.	<p>What is temperature? (G3)</p> <p>What is air flow? (G3)</p> <p>What is symbiosis? (G2, G5)</p> <p>What roles do microorganisms play in the soil food web? (G2, G3)</p>
3. Microorganisms can only survive in optimal conditions.	<p><b>CONCEPTUAL</b></p> <p>What are optimal conditions for microorganism survival? (G3)</p> <p>How does soil quality impact plant survival? (G1, G3)</p>
4. Decomposition of organic	<p>How does PH Level effect soil and compost? (G3)</p>

matter in soils is vital for the survival of any ecosystem.

5. As individual plants and soil organisms work to survive, they depend on interactions with each other.

What is the relationship between plants, soil, and nutrients? (G2, G5)

How can moisture content effect the rate of decomposition within a compost pile? (G4)

What could happen to plants if decomposition did not occur? (G4, G5)

PROVOCATIVE

What is the most effective method of starting a compost pile? (G4, G5)

Is composting food scraps from a home kitchen worthwhile? (G2)

## Standard(s)

*Connecticut Core Standards / Content Standards*

**NGSS: Science Performance Expectations (2017)**

**NGSS: HS Life Sciences**

### **HS.Matter and Energy in Organisms and Ecosystems Performance Expectations**

HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

### **HS.Interdependent Relationships in Ecosystems Performance Expectations**

HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.\*

**CT: CTE: Agricultural Science (2011)**

**Grades 9-12**

#### **Plant Science**

**A. Plant Science: Understand the concepts and skills necessary related to plant science technology.**

3. Describe the influence of soil (including growing media), water and other environmental factors on horticultural plant growth.

**CT: ASTE-Agricultural Science and Technology Education Standards 2014**

**Grades 9-12**

#### **Agriculture, Food, and Natural Resources Foundation Skills**

**CT-FS.09. Performance Element: Scientific Inquiry: Utilize scientific inquiry as an investigative method.**

CT-FS.09.02. Performance Indicator: Design and conduct a scientific investigation.

#### **Natural Resources Systems**

**Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and techniques to the management of natural resources.**

**CT-NRS.01. Performance Element: Explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.**

CT-NRS.01.01. Performance Indicator: Apply knowledge of natural resource components to the management of natural resource systems

CT-NRS.01.02. Performance Indicator: Classify natural resources.

CT-NRS.02.01. Performance Indicator: Develop a safety plan for work with natural resources.

CT-NRS.06.01. Performance Indicator: Apply soil science principles to environmental service systems

**Plant Science**

**Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and techniques to the production and management of plants**

CT-PS.02.02. Performance Indicator: Evaluate soil/media and prepare soil/growth media for use in plant systems

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**Critical Content & Skills**

*What students must KNOW and be able to DO*

TOPIC	CONTENT	SKILLS
Microbes	<b>Describe</b> the effects of "Good" Microbes and "Bad" Microbes in Compost & Soil	<b>Harvest</b> Lactobacillus bacteria from rice
	<b>Explain</b> the role of Microbes in Compost & Soil	<b>Make</b> Compost Teas
	<b>Select</b> the best method for harvesting Microbes from Compost & Soil	<b>Apply</b> Compost Teas
	<b>Manage</b> the Microbes in Compost & Soil	<b>Inoculate</b> Soil with Lactobacillus
	<b>Distinguish</b> between three groups of bacteria working at three different temperature zones: Psychrophilic, Mesophilic, and Thermophilic bacteria	
Micro & Macro Invertebrates	<b>Define</b> the role of Micro-invertebrates / Macro-invertebrates in the Food Web and Decomposition.	<b>Identify</b> the Role of Micro-invertebrates / Macro-invertebrates in the Food Web and Decomposition.
	<b>Explain</b> positive & negative effects of Micro-invertebrates / Macro-invertebrates in the Food Web and Decomposition.	<b>Predict</b> positive & negative effects of Micro-invertebrates / Macro-invertebrates in the Food Web and Decomposition in the Garden at NHS.
	<b>Explain</b> the role of PH, Moisture, Temperature, and Air Flow in maintaining a productive compost pile.	<b>Monitor</b> the moisture, pH, air flow, and temperature in our school compost pile.
Environmental Factors	<b>Define</b> the three phases that compost can be in under various temperatures: Psychrophilic, Mesophilic, and Thermophilic phases.	<b>Amend</b> the compost pile according to moisture, pH, air flow, and temperature
	<b>Explain</b> how PH, Moisture, Temperature, and Air Flow	<b>Determine</b> the current phase of the composting process by measuring the

are interdependent to one another in composting and decomposition.

**Identify** Micro/Macro Nutrients & **Indicate** Necessary Elements & Minerals: Nitrogen, Phosphorus, Potassium, Calcium, Sulfur, Magnesium, Iron, Manganese, Copper, Zinc, Boron, Chloride, Molybdenum

Elements and Minerals

**Monitor** environmental factors (PH, Moisture, Temperature, Air Flow) in nutrient uptake.

**Explain** effects of environmental factors (PH, Moisture, Temperature, Air Flow) in nutrient uptake.

**Utilize** Mycorrhizal Fungi in soil and compost

Fungi

**Understand** complex interrelationship of plants & fungi

**Describe** symbiotic relationship of fungi and plants

temperature within the compost pile.

**Identify** when it is appropriate to mix the contents of the pile according to temperature.

**Test** soil and compost for Nutrient Levels

**Make** amendment decisions based on Nutrient Level in soil and compost

**Survey** Elements & Minerals in soil and compost

**Feed & Maintain** soil and compost in the Garden & Greenhouse

**Harvest** indigenous fungi

**Monitor** campus fungi levels

**Adjust** environmental factors (PH, Moisture, Temperature, Air Flow) to ensure fungi grow and thrive.

## Core Learning Activities

Composting [Slideshow](#)

Composting [Vocabulary](#)

Composting [Worksheet](#)

Composting [Crossword Puzzle](#)

Compost [campaign](#)

soil testing and other soil based [activities](#)

Garden Soil [Lesson](#)

[Dig Deeper](#) (soil activities and games)

Compost Jin [card game](#)

compost [teas](#)

[Making LAB](#) (Lactobacillus)

[Korean](#) Natural Farming Practices

Fermented plant [extract](#) and [juices](#)



[Properties of Soil Slideshow](#)

[Properties of Soil Background Information](#)

[Properties of Soil Worksheet](#)

[Properties of Soil Crossword Puzzle](#)

## Assessments

**Properties of Soil Test**

**Summative:**

**Written Test**

[Properties of Soil Test](#)

**Composting Test**

**Summative:**

**Written Test**

[Composting Test](#)

**Cornell**

**Compost Quiz**

**Game**

**Summative:**

**Written Test**

[Cornell Composting Quiz Game](#)

**Cornell**

**Composting**

**Quiz Game**

## Resources

*Professional & Student*

[Cornell Composting](#)

[Composting 101](#)

[Soils 4 Teachers](#)

**\*\* Colorado State University Extension - Composting Yard Waste**

<http://extension.colostate.edu/docs/pubs/garden/07212.pdf>

**\*\* Cornell Waste Management Institute - Composting**

Includes resources on composting for farms, residences and businesses

<http://cwmi.css.cornell.edu/composting.htm>

**\*\* Lowe's Project Center - Making Compost**

<https://www.lowes.com/projects/gardening-and-outdoor/learn-to-compost/project>

**\*\* National Public Radio - Science Friday Videos - A Compost Guru Shares His Secrets** 3:59-minute video interviewing Malcolm Beck of Texas

<https://vimeo.com/30598097>

**\*\* North Carolina Cooperative Extension Service -Backyard Composting of Yard, Garden, and Food Discards**

<https://content.ces.ncsu.edu/backyard-composting-of-yard-garden-and-food-discards>

**\*\* North Carolina State University - Vermicomposting for Households**

Vermicomposting uses worms in the composting process.

<https://composting.ces.ncsu.edu/vermicomposting-2/vermicomposting-for-households/>

**\*\* Ohio State University - Compost Facility Tour, Part I**

<https://plantfacts.osu.edu/movies/abstract.lasso?id=1906a>

**\*\* Ohio State University - Compost Facility Tour, Part II**

<https://plantfacts.osu.edu/movies/abstract.lasso?id=1906b>

**\*\* Ohio State University Extension - Composting at Home**

[http://www.therockpile.com/wp-content/uploads/2010/01/OSU\\_composting.pdf](http://www.therockpile.com/wp-content/uploads/2010/01/OSU_composting.pdf)

**\*\* U.S. Environmental Protection Agency - Composting at Home**

A good basic description of composting, including lists of what should and should not be composted

<https://www.epa.gov/recycle/composting-home>

**\*\* U.S. National Arboretum - Creating Compost**

A simple description of composting

<https://www.usbg.gov/creating-compost>

**\*\* University of Florida Extension - Farm Scale Composting**

[http://blogs.ifas.ufl.edu/smallfarms/2017/11/30/composting/?mc\\_cid=64fe46323f&mc\\_eid=b9bb859ac1](http://blogs.ifas.ufl.edu/smallfarms/2017/11/30/composting/?mc_cid=64fe46323f&mc_eid=b9bb859ac1)

**\*\* University of Minnesota Extension Service - Composting and Mulching**  
<https://conservancy.umn.edu/bitstream/handle/11299/54827/3296.pdf>

**\*\* University of Missouri-Columbia - Making and Using Compost**  
Includes detailed information for constructing compost piles  
<https://extension2.missouri.edu/G6956>

**\*\* Whatcom County Public Works - Easy Composting**  
Includes two methods for making compost -- an easy way and a quicker way  
<http://www.whatcomcounty.us/DocumentCenter/View/1871/Easy-Composting-PDF>

### **Soils**

**\*\* Dr. Dirt - Soil Air and Composition**  
Uses marbles, golf balls, beads, and water to illustrate soil components  
<https://www.doctordirt.org/teachingresources/idealsoil>

**\*\* Smithsonian Environmental Research Center - Dig It! The Secrets of Soil**  
Reports on an exhibit at the Smithsonian Museum of Natural History  
<http://forces.si.edu/soils/>**\*\* U.S. Department of Agriculture - FFA Students Learn To Judge Land And Soil**  
1:38-minute video showing FFA students in soils judging contest  
<https://www.youtube.com/watch?v=jj3eEbxDmr8>

**\*\* USDA Natural Resources Conservation Service (NRCS) - Soils home page**  
<https://www.nrcs.usda.gov/wps/portal/nrcs/site/soils/home/>

**\*\* USDA (NRCS) - Distribution Maps of Dominant Soil Orders**  
Shows photos of each type of soil and maps showing where those types are found.  
[https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/?cid=nrcs142p2\\_053589](https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/class/?cid=nrcs142p2_053589)

**Student Learning Expectation & 21st Century Skills**

Information Literacy  
Critical Thinking  
Spoken Communication  
Written Performance

**Interdisciplinary Connections**

Biology

Botany

Chemistry

Ecology

Environmental Science

Geology

Language Arts

Personal Financial Literacy

Business Foundations

Digital Media & Communications

Fine Arts



# Unit Planner: Enterprise Practices & Career Readiness Greenery (1 & 2)

Newtown High School / 2022-2023 / High School / BEAT/Science /  
Greenery (1 & 2) / Week 2 - Week 18

Last Updated: Wednesday, June 29, 2022  
by Shawn Mullen

## Enterprise Practices & Career Readiness

Mullen, Shawn; Stamm, Anastasia

- [Unit Planner](#)
- [Lesson Planner](#)

### Concept-Based Unit Development Graphic Organizer (Download)

[Unit Web Template \(Optional\)](#)

#### Concepts / Conceptual Lens

Please attach your completed Unit Web Template here

Lens: Systems

Concepts: Enterprise, Opportunity, Industry, Supply & Demand, Profit, Marketing, Design, Safety

G

#### Generalizations / Enduring Understandings

1. The US Agriculture Industry provides a multitude of career opportunities - no farms, no food.
2. Different careers require employees to possess specific skills and traits.
3. Safety practices and systems ensure all are safe in a working environment.
4. Effective marketing and supply & demand practices drive enterprise success, measured by profit margin.

#### Guiding Questions

Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]

##### FACTUAL

What is an enterprise? (G4)

What career opportunities are available in the agriculture industry? (G1)

What skills and traits should a person possess for specific careers within the agriculture industry? (G2)

What safety practices must we follow in the lab, greenhouse, and garden? (G3)

##### CONCEPTUAL

What systems can be put in place to ensure all work safely in the lab, greenhouse, and garden? (G3)

What are different marketing strategies for different target consumers? (G4)

How can profit from sales efforts be guaranteed? (G4)

How does an enterprise determine which products to sell? (G4)

##### PROVOCATIVE

How can an organization ensure each individual and the

job they perform is vital to greater success? (G1)

What are the best ways to market a product? (G4)

What makes the design of a product aesthetically pleasing to different consumers? (G4)

## Standard(s)

*Connecticut Core Standards / Content Standards*

### **NGSS: Crosscutting Concepts**

#### **NGSS: 9-12**

##### **Crosscutting Statements**

**1. Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.**

Patterns of performance of designed systems can be analyzed and interpreted to reengineer and improve the system.

**2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.**

Systems can be designed to cause a desired effect.

**4. Systems and System Models – A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.**

Systems can be designed to do specific tasks.

**7. Stability and Change – For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.**

Feedback (negative or positive) can stabilize or destabilize a system.

##### **Connections to Engineering, Technology and Applications of Science**

###### **Interdependence of Science, Engineering, and Technology**

Science and engineering complement each other in the cycle known as research and development (R&D).

### **CT: CTE: Agricultural Science (2011)**

#### **Grades 9-12**

##### **Plant Science**

**D. Marketing: Understand the sequence of the channels of distribution and marketing including their impact on the agriculture industry.**

20. Understand supply and demand principles in Agriculture, Food, and Natural Resource systems.

21. Identify strategies frequently employed in agricultural marketing programs.

22. Define the concept of profit and loss in agricultural business.

24. Explain the impact of positive customer/client relations.

**E. Career Exploration and Development: Understand the diversity of careers related to the agricultural industry and strategies to acquire and advance in an agricultural career.**

25. Identify the employability skills required for various careers in agriculture.

28. Identify ways to develop and maintain professional relationships to enhance career success.

### **CT: ASTE-Agricultural Science and Technology Education Standards 2014**

#### **Grades 9-12**

##### **Agriculture, Food, and Natural Resources Foundation Skills**

**CT-FS.02. Performance Element: Career Success: Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career.**

CT-FS.02.01. Performance Indicator: Understand the use and application of information-based technologies necessary for career success in agriculture

**CT-FS.03. Performance Element: Utilize economic principles to establish and manage an AFNR enterprise.**

CT-FS.03.01. Performance Indicator: Understand the sequence of the channels of distribution and marketing including their impact on the agriculture industry.

**CT-FS.04. Performance Element: Apply principles of environment science.**

CT-FS.04.01. Performance Indicator: Observe required regulations to maintain/improve safety, health and environmental management systems.

**CT-FS.05. Performance Element: Apply safety/health practices to AFNR worksites.**

CT-FS.05.04. Performance Indicator: Assess workplace safety.

**CT-FS.07. Performance Element: Utilize appropriate management planning principles in AFNR business enterprises.**

CT-FS.07.01. Performance Indicator: Apply economic principles to AFNR systems (e.g., supply, demand and profit).

CT-FS.07.02. Performance Indicator: Apply skills with computer software to accomplish a variety of business activities.

**CT-FS.08.0. Performance Element: Utilize technology within AFNR.**

CT-FS.08.02. Performance Indicator: Relate technology advancements to the need for Continuing Education/Career Development.

**CT-FS.10. Performance Element: Technical Skills: Compare and contrast issues affecting the AFNR industry.**

CT-FS.10.01. Performance Indicator: Apply economic principles to AFNR systems (e.g., supply, demand and profit).

CT-FS.10.02. Performance Indicator: Apply skills with computer software to accomplish a variety of business activities.

CT-FS.10.03. Performance Indicator: Flexibility / Adaptability: Describe traits that enable one to be capable and willing to accept change.

**CT-FS.11. Performance Element: Systems: Examine roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment.**

CT-FS.11.01. Performance Indicator: Examine performance and goals to appreciate organizations and industries within AFNR.

**CT-FS.12. Performance Element: Systems: Identify how key organizational structures and processes affect organizational performance and the quality of products and services.**

CT-FS.12.01. Performance Indicator: Manage organizational structures and processes to better serve customers.

### **Leadership Skills**

**Pathway Content Standard: The student will demonstrate competence in the application of leadership, personal growth and career success skills necessary for a chosen profession while effectively contributing to society**

CT-LS.01.01. Performance Indicator: Action: Exhibit the skills and competencies needed to achieve a desired result

CT-LS.01.02. Performance Indicator: Relationships: Build a constituency through listening, coaching, understanding and appreciating others.

**CT-LS.02. Performance Element: Personal Growth: Develop a skill set to enhance the positive evolution of the whole person.**

CT-LS.02.03. Performance Indicator: Professional Growth: Develop awareness and apply skills necessary for achieving career success.

CT-LS.02.04. Performance Indicator: Mental Growth: Demonstrate the effective application of reasoning, thinking, and coping skills.

**CT-LS.03. Performance Element: Career Success: Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society.**

CT-LS.03.01. Performance Indicator: Communication: Demonstrate oral, written and verbal skills

CT-LS.03.03. Career Exploration and Development: Understand the diversity of careers related to the agricultural industry and strategies to acquire and advance in an agricultural career

### **Natural Resources Systems**

**Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and techniques to the management of natural resources.**

**CT-NRS.01. Performance Element: Explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.**

CT-NRS.01.01. Performance Indicator: Apply knowledge of natural resource components to the management of natural resource systems

CT-NRS.03.01. Performance Indicator: Produce, harvest, process and use natural resource products

CT-NRS.05.01. Performance Indicator: Communicate natural resource information to the public

### **Plant Science**

**CT-PS.03. Performance Element: Propagate culture and harvest plants.**

CT-PS.03.04. Performance Indicator: Apply principles and practices of various plant production methods to meet

the needs of the market.

**CT-PS.04. Performance Element: Employ elements of design to enhance an environment.**

CT-PS.04.01. Performance Indicator: Create designs using plants.

CT-PS.04.02 Performance Indicator: Determine supplies needed to create landscape designs and develop a marketing plan

**Power Structural and Technical Systems (Agriculture Mechanics)**

**CT-PST.05. Performance Element: Plan, build and maintain agricultural structures.**

CT-PST.05.01. Performance Indicator: Create sketches and plans of agricultural structures.

CT-PST.05.03. Performance Indicator: Examine structural requirements for materials and procedures and estimate construction cost.

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Access the interactive version of the NGSS [here](#)

**Critical Content & Skills**

*What students must **KNOW and be able to DO***

<u>Topic</u>	<u>Content</u>	<u>Skills</u>
Safety	<b>Demonstrate</b> use of tools and equipment aligning with safe work habits.	<b>Exhibit</b> safe work practices in the lab, greenhouse, and garden.
	<b>Recognize</b> when others do something unsafely, and help to redirect to work more safely <b>Develop</b> purchase lists for plant sales.	Implement safe use of tools and equipment in the lab, greenhouse, and garden.
Sales, Finance, & Budgeting	<b>Determine</b> pricing for plant sales.	<b>Collaborate</b> with peers to make decisions for plant sales
	<b>Analyze</b> profit margin for plant sales. <b>Design</b> systems to monitor & document inventory, sales, and deposits.	<b>Manage</b> pricing, bookkeeping, and inventory for plant sales <b>Execute</b> plant sales
Marketing & Advertising	<b>Create</b> systems for communicating upcoming sales to consumers.	<b>Produce</b> marketing materials for distribution to bring awareness of sales to consumers.
	<b>Design</b> systems for selling products to consumers during sales periods.	<b>Communicate</b> with consumers the methods for transactions and delivery of plants.
Agricultural & Floral Design	<b>Survey</b> past and future consumers to determine product demand <b>Design</b> aesthetically pleasing outdoor landscaping that is appropriate for the project scope and function.	<b>Construct</b> aesthetically pleasing outdoor landscaping that is appropriate for the project scope and function.
	<b>Design</b> aesthetically pleasing indoor arrangements (centerpieces/wreathes/bouquets,	<b>Create</b> aesthetically pleasing indoor arrangements (centerpieces/wreathes/bouquets,



etc) of cut plants/flowers, appropriate for the project scope and function.

**Explore** careers within the Agriculture Industry

Occupational  
Preparation

**Determine** individual aptitude & interest in specific careers within the Agriculture Industry

**Discuss** logistics and management systems within the Agriculture Industry.

etc) of cut plants/flowers, appropriate for the project scope and function.

**Research** careers within the Agriculture Industry

**Express** rationale for personal aptitude & interest in specific careers within the Agriculture Industry

**Compare** logistics and management systems within the Agriculture Industry to those systems used working in our Greenhouse and Garden.

## Core Learning Activities

Productivity/Professionalism Rubric

Generic Flyer Document

Fall Mums sale

Fall Mums Flyer

Learning About Chrysanthemums Notes

Learning About Chrysanthemums Worksheet

Learning About Chrysanthemums Crossword

Learning About Chrysanthemums Quiz

Holiday Centerpiece Photos

Holiday Centerpieces Rubric

Holiday Poinsettia Sale

Video about the Paul Ecke Poinsettia Ranch

Growing Poinsettias Notes

Growing Poinsettias Worksheet

Growing Poinsettias Crossword

Growing Poinsettias Quiz

Valentines Day Carnation Sale

[Valentines Day Flyer](#)

[Spring Plant sale Flyer](#)

[Spring Sale Advertisement for faculty and staff](#)

### Assessments

#### **Career Profile**

#### **Summative: Exhibition**

develop an understanding of several jobs related to the field of Greenery, Agriculture, Botany, Farming, Soil management, Etc.

[Career Profile](#)

### Resources

*Professional & Student*

[US Dept of Agriculture Careers](#)

[Agriculture Careers Database by US Region](#)

[US Occupational Health & Safety Administration - Agricultural Operations](#)

[US Dept of Agriculture - Nat'l Institute of Farms & Agriculture - Farm Safety](#)

### Student Learning Expectation & 21st Century Skills

[Information Literacy](#)

[Critical Thinking](#)

[Spoken Communication](#)

[Written Performance](#)

### Interdisciplinary Connections

Biology

Botany

Chemistry

Ecology

Environmental Science

Geology

Language Arts

Personal Financial Literacy

Business Foundations

Digital Media & Communications

Fine Arts

# DRAFT

## NEWTOWN BOARD OF EDUCATION 2023 SCHEDULE OF MEETINGS

Meetings will be held in the Newtown Municipal Center Council Chamber, 3 Primrose Street, at 7:00 p.m. with the exception of those which will be held in the Reed Intermediate School library as indicated below.

January 3 – *Reed Library*  
January 17 (budget overview) – *Reed Library*  
January 19 (budget) – *Reed Library*  
January 24 (budget)  
January 26 (public hearing & discussion)  
January 31 (budget adoption)  
February 7  
February 22 (Wednesday) – *Reed Library*  
March 7  
March 21  
April 4  
April 18  
May 2  
May 16  
June 6  
June 20  
July 11  
August 22  
September 5 – *Reed Library*  
September 19  
October 3  
October 17  
November 8 (Wednesday) – *Reed Library*  
November 21  
December 5  
December 19

January 2, 2024 – *Reed Library*  
January 16, 2024 – *Reed Library*

Approved

**Please note: These minutes are pending Board approval.  
Board of Education  
Newtown, Connecticut**

Minutes of the Board of Education meeting held on November 15, 2022, at 7:00 p.m. in the Council Chambers, 3 Primrose Street.

D. Zukowski, Chair (virtually)	C. Melillo
J. Vouros, Vice Chair	A. Uberti
D. Ramsey, Secretary	T. Vadas
D. Cruson	4 Staff
J. Kuzma	1 Public
J. Larkin	
A. Plante	
K. Kunzweiler (absent)	
D. Godino	

Ms. Zukowski called the meeting to order at 7:01 p.m.

Ms. Zukowski asked Mr. Vouros to run the meeting because she was unable to attend the meeting in person.

Item 1 – Pledge of Allegiance

Item 2 – Consent Agenda

MOTION: Mrs. Kuzma moved that the Board of Education approve the consent agenda which includes the donations to Reed Intermediate School, the NHS Band, Chorus and Orchestra Field Trip to Boston, and the correspondence report. Mr. Ramsey seconded.

Motion passes unanimously.

Item 3 – Public Participation

Item 4 – Reports

Chair Report: Ms. Zukowski will share her chair report at the next Board of Education meeting.

Superintendent's Report:

Mr. Melillo reported that all of the schools celebrated Veteran's Day on Friday, November 11<sup>th</sup>. He attended a Veteran's breakfast at Newtown Middle School followed by a parade at Sandy Hook School and celebration ceremony at Newtown High School. Mr. Melillo believes having the students in school teaches them about appreciation for our Veterans. He provided an update on mandated reading programs that are required by State Legislation. There are currently six programs that are approved by the State of Connecticut. We plan to bring recommendations to the Board by early December. On November 7<sup>th</sup> the Strategic Planning group met and discussed the SWOT analysis which stands for "strengths, weaknesses, opportunities and threats". The group also shared their hopes and dreams for Newtown Public Schools. The next meeting will be on November 21<sup>st</sup>. He also sent a letter to Newtown Middle School parents regarding student walkers. The intent for the letter was to open communication between the parents and students. He also wanted the parents to be aware of the reports he was receiving from the public.

Committee Reports:

Mrs. Larkin reported on the CFF/CIP subcommittee meeting. The subcommittee discussed the Hawley HVAC project status and Mr. Gerbert provided the committee with a detailed outline of the expenses to date. The project remains to be on time and on budget with no major deviations from the schedule. Additionally, the committee made a motion to add to the agenda for a follow up conversation regarding the playground at Middle Gate Elementary School. The subcommittee will continue the conversation after the first of the year. Mrs. Larkin reported that

Mrs. Vadas provided the subcommittee with an update on the financial report. There are no significant emergency repairs to report on the building and maintenance side.

Mr. Ramsey reported on the Curriculum & Instruction subcommittee meeting. The subcommittee met on November 9<sup>th</sup>. Staci Stamm and Shawn Mullen presented the Greenery 1 & 2 curriculum. They will be presenting to the Board tonight for the first read. Mrs. Uberti provided an update on the status of the State Department of Education's K-3 reading mandate. Presentations for the five approved programs have been scheduled and will be concluded this week. A sixth program has been added and will be scheduled as soon as possible. Mrs. Uberti, along with Mrs. DiBartolo and the ELA Specialists will be reviewing the programs to determine which might be a fit for our district.

Mr. Ramsey reported on the Communications subcommittee where they discussed the recent newsletter. Unfortunately, they were unable to go over the analytics because it was sent out as a PDF. They also reviewed editing procedures to ensure future editions will go out on time.

Mr. Cruson reported on the Policy subcommittee which met November 9<sup>th</sup>. In addition to reviewing the policies for first read tonight, the subcommittee had further discussion on the consultant's policy. They decided it was not appropriate for the 4000 series and will be considering a potential policy in the 6000 series which is the "Instruction" series. The next group of policies that the subcommittee is currently working on is the technology/personnel policies. Mrs. D'Eramo and Mr. Colclough are working with the policy subcommittee on editing those policies.

#### Student Report:

Mr. Godino reported that Ms. Kunzweiler was unable to attend the meeting because dress rehearsal for the fall drama "Almost Maine", running Thursday, November 17 through Sunday, November 20. He reported that the fall sports season comes to a close as we reach the midpoint of November. Newtown High School students are very excited that The Newtown Nighthawks Express re-opened for the first time since 2020. On Veteran's Day, the staff of NHS and members of the Hawks Honors Association hosted a lunch for Veterans followed by an assembly at which the band and choir preformed. Last week was GSA Solidarity Week which offers an opportunity for students with a variety of identities to share their support for one another. NHS students also attended the 2022 Homecoming Dance.

#### Financial Report:

Mrs. Vadas presented the financial report.

MOTION: Mrs. Kuzma moved that the Board of Education approve the financial report and transfers for the month of October 31, 2022. Mrs. Larkin seconded. Motion passes unanimously.

#### Item 5 – Presentations

Staci Stamm and Department Chair, Eric Holst-Grubbe, presented the curriculum for Greenery 1 & 2. Ms. Stamm wrote this curriculum with Shawn Mullens, who was unable to attend the meeting. This class is offered in the fall and spring and can act as an elective credit or a science credit.

Mrs. Larkin asked which grades this class was available to.

Ms. Stamm answered that it is an elective open to grades 9 through 12. It provides an opportunity to have every type of student in the same room at the same time.

Mrs. Larkin asked if all five units were used in the same course.

Ms. Stamm said that depending on which time of the year they are taking the course, all but five units are discussed in the semester. It is a half-year class so students get two chances to take this course.

Mrs. Larkin can understand why students would want to take it every year.

Ms. Stamm believes that there are some students that do take it every year.

Mrs. Plante commented that she thinks this class is very cool.

Mrs. Kuzma asked what the average class size was.

Ms. Stamm answered that they currently have five sections and due to space in the greenhouse, they are capped at 14 students per section which turns out to be around 140 students per year.

Mr. Ramsey visited this class with Shawn Mullen and, after talking with students, said it was gratifying to go into the classroom and see that the curriculum was being implemented the same way it looked on paper.

Ms. Zukowski commented that she believes it is an excellent course and hope to learn something from the students.

Mr. Vouros encouraged everyone to go to visit.

Mr. Melillo said that he loved going to visit this course. Connecting this course to the food pantry and culinary program gave students a purpose. It is rare to find a course where students are so engaged that they are coming in on their own time to work in the garden or work on their sales.

Fine Arts Update:

Director of Fine Arts, Michele Hiscavich, presented some updates and accomplishments in the Fine Arts Department. She started her presentation by stating that her program is focused on "Creative Futures" and setting up a future for their students within the fine arts.

Ms. Zukowski asked how often the students go to a visual arts class during the week or six day cycle.

Ms. Hiscavich answered that at the elementary schools, the students meet once every six days. At Reed, the students meet twice every six days. At Newtown Middle School, the students meet twice every seven days for art and they meet twice a week for band, music and orchestra but there are no lessons. Lastly, at Newtown High School, the students have their music and art classes every day but are dropped twice out of the eight day rotation.

Mrs. Kuzma asked if there was a decline in interest in arts during COVID and if so, what was being done to regain interest.

Ms. Hiscavich said that they are doing things to regain interest in the students. They have gone to Reed to showcase the NMS/NHS band and choir. She also plans to create programs to help recruit elementary students in the future. Older students talking to younger students can be a powerful tool as well.

Mrs. Kuzma asked which department took the biggest decline.

Ms. Hiscavich said that music did.

Mr. Vouros thanked Ms. Hiscavich for her passion and love for the Fine Arts.

Mr. Melillo said he had the pleasure to attend many of the events and see the students in action. They have done a wonderful job and it is another instance that shows how dedicated students are coming back on their own time to practice and work on their craft. This can be a career path and colleges value music/fine arts. Mr. Melillo thanked Ms. Hiscavich for her leadership.

Item 6 - Old Business

## Second Read of Policies:

MOTION: Mrs. Kuzma moved that the Board of Education approve Policies 4118.231 and 4218.231 Alcohol, Tobacco, and Drug-Free Workplace. Mrs. Plante seconded. Motion passes unanimously.

MOTION: Mrs. Kuzma moved that the Board of Education approve to rescind Policy 4-111 Student Teachers. Mrs. Plante seconded. Motion passes unanimously.

MOTION: Mrs. Kuzma moved that the Board of Education approve to rescind Policy 4-702 Drug Free Workplace. Mr. Ramsey seconded. Motion passes unanimously.

Item 7 – New Business

## First Read of Policies:

Mr. Cruson explained that Policy 4111/4211 – Recruitment and Selection is an existing policy but the subcommittee is recommending some adjustments to better designate that the Superintendent is the one to do the recruiting and hiring for non-administrative certified and non-certified staff.

Mr. Cruson explained that Policy 2151 – Hiring School Administrators is also an existing policy. The edits are to clarify the practice of hiring administrators and the Board's role in doing so.

Mr. Cruson reported that Policy 4121 – Substitute Teachers was edited with the help of Newtown's Director of HR, Suzanne D'Eramo. The subcommittee removed language that would restrict substitutes from possibly receiving health insurance in the future.

Mr. Cruson reported that the subcommittee is recommending rescinding Policy 4-501 – Substitute Teachers and Policy 4-501.1 – Leave Provisions for Per Diem Substitutes.

MOTION: Mrs. Kuzma moved that the Board of Education approve the minutes of November 1, 2022. Mrs. Larkin seconded. Motion passes unanimously.

Item 8 – Public Participation

MOTION: Mr. Plante moved to adjourn. Mrs. Larkin seconded. Motion passes unanimously.

Item 9 – Adjournment

The meeting adjourned at 8:21 p.m.

Respectfully submitted:

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Donald Ramsey  
Secretary

**NEWTOWN PUBLIC SCHOOLS**  
**Newtown, Connecticut**

ENROLLMENT REPORT AS OF November 30, 2022

Grade	<u>Current Monthly Enrollment</u>				<u>Cumulative Year-to-Date</u>			
	Oct(e) 2022	Added	Left	Nov 2022	Sept 6th 2022	Added	Left	Nov 2022
K	232	2	1	233	231	4	2	233
1	295	1	1	295	292	4	1	295
2	277	0	0	277	276	2	1	277
3	277	0	0	277	277	1	1	277
4	289	0	1	288	289	1	2	288
Total Elementary	1,370	3	3	1,370	1,365	12	7	1,370
5	293	3	0	296	292	5	1	296
6	284	2	1	285	284	4	3	285
Total Intermediate	577	5	1	581	576	9	4	581
7	310	0	0	310	311	2	3	310
8	296	2	1	297	295	3	1	297
Total Middle	606	2	1	607	606	5	4	607
9	292	3	0	295	291	4	0	295
10	341	2	1	342	341	3	2	342
11	337	1	0	338	334	4	0	338
12	358	0	1	357	358	0	1	357
Total High	1,328	6	2	1,332	1,324	11	3	1,332
<u>Special Education</u>								
Pre-Kdg	77	4	0	81	75	6	0	81
NCP, RISE, PAL	30	0	1	29	31	0	2	29
Out-of-Town	44	2	0	46	45	2	1	46
Total Enrollment	4,032	22	8	4,046	4,022	45	21	4,046
	=====	===	===	=====	=====	===	===	=====
<u>ENROLLMENT BY SCHOOL</u>								
Hawley	288	1	0	289	286	4	1	289
Sandy Hook	364	0	1	363	364	3	4	363
Middle Gate	390	1	2	389	388	3	2	389
Head O' Meadow	328	1	0	329	327	2	0	329
Total	1,370	3	3	1,370	1,365	12	7	1,370
Reed Intermediate	577	5	1	581	576	9	4	581
Middle School	606	2	1	607	606	5	4	607
High School	1,328	6	2	1,332	1,324	11	3	1,332
<u>Special Education</u>								
Pre-Kdg	77	4	0	81	75	6	0	81
NCP, RISE, PAL	30	0	1	29	31	0	2	29
Out-of-Town	44	2	0	46	45	2	1	46
Total Enrollment	4,032	22	8	4,046	4,022	45	21	4,046
	=====	===	===	=====	=====	===	===	=====

(e) = End Of Month

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**NEWTOWN PUBLIC SCHOOLS**  
Newtown, Connecticut

ELEMENTARY CLASS SIZES AS OF November 30, 2022

Grade	Hawley	Sandy Hook	Middle Gate	Head O' Meadow	Reed	TOTAL
<b>Pre K</b>		<b>81</b>				<b>81</b>
<b>K</b>	13	15	18	16		
	13	16	16	17		
	13	16	15	17		
		15	17	16		
<b>Total K</b>	<b>39</b>	<b>62</b>	<b>66</b>	<b>66</b>		<b>233</b>
<b>1</b>	17	16	15	17		
	17	16	18	19		
	18	17	18	19		
	17	17	18			
		18	18			
<b>Total 1</b>	<b>69</b>	<b>84</b>	<b>87</b>	<b>55</b>		<b>295</b>
<b>2</b>	20	15	17	17		
	19	17	17	17		
	19	18	14	17		
		18	17	17		
			18			
<b>Total 2</b>	<b>58</b>	<b>68</b>	<b>83</b>	<b>68</b>		<b>277</b>
<b>3</b>	21	20	19	20		
	20	19	20	21		
	19	19	20	21		
		18	20			
<b>Total 3</b>	<b>60</b>	<b>76</b>	<b>79</b>	<b>62</b>		<b>277</b>
<b>4</b>	21	18	17	18		
	21	17	19	20		
	21	20	19	20		
		18	19	20		
<b>Total 4</b>	<b>63</b>	<b>73</b>	<b>74</b>	<b>78</b>		<b>288</b>
<b>Total K-4</b>	<b>289</b>	<b>363</b>	<b>389</b>	<b>329</b>		<b>1,370</b>

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