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

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

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

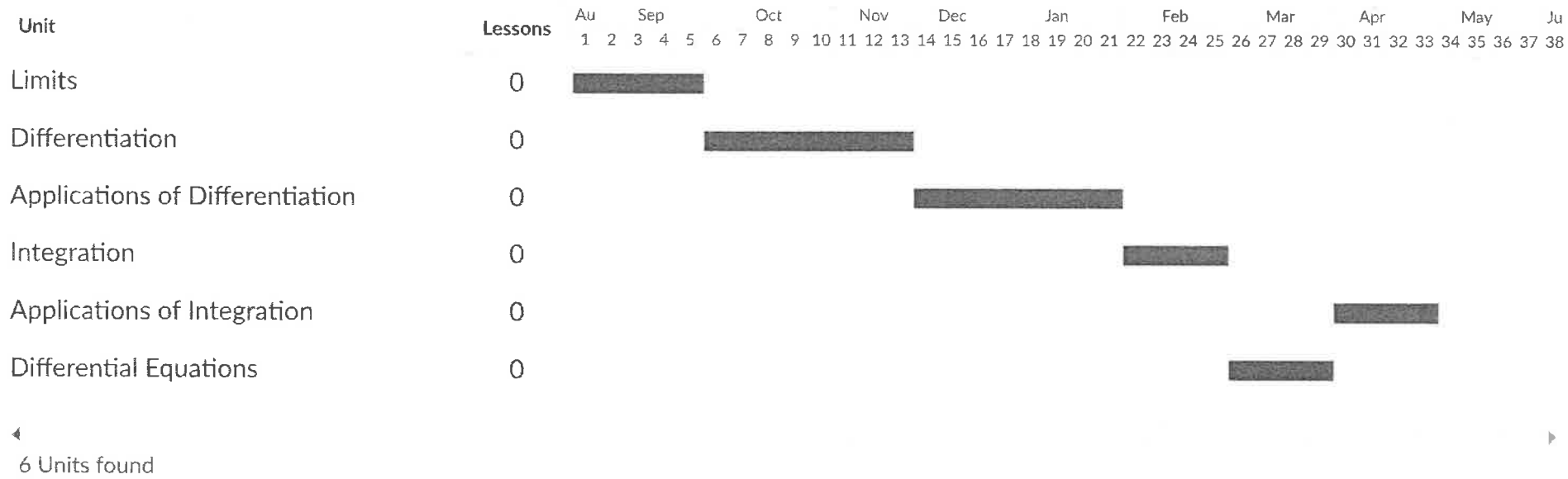
Newtown Public Schools

Atlas

AP Calculus A/B (College Board AP)

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

Unit Calendar by Year



6 Units found

Previous Year

Unit Planner: Limits
AP Calculus A/B

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus A/B (College Board AP) / Week 1 - Week 5

Last Updated: Sunday, June 26, 2022 by Charlotte Cavataro

Limits

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 • 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)

For continuity to exist at a point, the functions defined value equals the limit at that point.	• How can a function be undefined but still have a limit? (S1/S2) Provocative: • How can limits be effectively used in real-world applications? (S1/S2) • Why are one-sided limits equal to infinity, but the limit existence theorem does not allow the limit to exist? (S1/S2)

Standard(s)
Connecticut Core Standards / Content Standards

Critical Content & Skills
*What students must **KNOW and be able to DO***
Students must be able to:
Evaluate limits from a graph or from an expression
Define continuity from a graph or an expression

Core Learning Activities
Evaluate limits from a graph or from an expression

- Given a limit, evaluate algebraically.
- Evaluate a limit given a graph.
- Define where limits do not exist based on a graph.
- Evaluate one-sided limits from a graph or algebraically.
- Use properties of limits to evaluate.

Define continuity from a graph or an expression

- Determine if continuity exists at key points of a piecewise function.
- Find the value of a variable that will make a function continuous at a given point.
- Determine if continuity exists algebraically.

Assessments
Summative Assessment
Summative: Written Test
Sample Assessment
Review for Quiz on Limits (Sections 1.6-1.8).pdf
Review for Quiz on Limits.pdf

Resources
Professional & Student
Department developed materials on google drive.

Student Learning Expectation & 21st Century Skills
Information Literacy
Critical Thinking
Spoken Communication
Written Performance

Interdisciplinary Connections
Physics-Rate of Change

Unit Planner: Differentiation
AP Calculus A/B

Monday, November 14, 2022, 12:42PM

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus A/B (College Board AP) / Week 6 - Week 13

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

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
- Differentiablity

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 • Differentiablity 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.

Unit 2 - Notes & Assignemts.pdf

Assessments	Resources
Review **Summative: Other written assessments** Calculus Ch -2 PT .pdf	*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

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus A/B (College Board AP) / Week 14 - Week 21

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

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 in 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)

- Related Rates
- Particle Motion
- L'Hopital's Rule

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.

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)

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)

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

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 A/B

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus A/B (College Board AP) / Week 22 - Week 25

Last Updated: Monday, June 27, 2022 by Paige Hyman

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 • Reimann 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: • Reimann Sum • definite integrals • area under a curve Generalization: A definite integral represents the area under a curve over a given interval. Reimann 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)

- rules of integration
- Fundamental Theorem of Calculus

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.

Conceptual:
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)

Provocative:
How is it possible for the area of an unbounded region to be finite? (S2)

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

- Apply the Properties of Integrals
- Apply Riemann Sums
- Apply the Fundamental Theorem of Calculus

Core Learning Activities
Apply Riemann Sums

- Approximate areas under a curve using the sum of areas of basic geometric shapes.
- Interpret the limiting case of the Riemann sum as a definite integral.
- Represent the limiting case of the Riemann sum as a definite integral.

Apply the Fundamental Theorem of Calculus

- Connect the area under the graph of a functions derivative with the net change in the function.
- Solve Problems related to the motion of a particle along a line.

Apply the Properties of Integrals

- Apply basic integration rules to find the integral of a function.
- Use the inverse process of differentiation to find the antiderivative of functions.

Assessments
Exam Sample Questions

Resources
Professional & Student
AP Classroom
Department developed materials
online resources

Student Learning Expectation & 21st Century Skills

Interdisciplinary Connections

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

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus A/B (College Board AP) / Week 30 - Week 33

Last Updated: Monday, June 27, 2022 by Charlotte Cavataro

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)

Definite integrals solve for areas between two curves and volumes of solids.	If the width of a rectangle is infinitesimally small is it still two dimensional? (S2)

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:

- Apply the Second Fundamental Theorem of Calculus in Real World problems
- Use integrals to solve for area under a curve and volume of solids

Core Learning Activities

Apply the Second Fundamental Theorem of Calculus in Real World problems

- determine the average value of a function using definite integrals
- determine values for positions and rates of change using definite integrals in problems involving rectilinear motions
- calculate areas in the plane using the definite integral

Use integrals to solve for area under a curve and volume of solids

- calculate volumes of solids with known cross sections using definite integrals
- calculate volumes of solids of revolution using definite integrals
- determine the length of a curve in the plane defined by a function, using a definite integral

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 Physics- particle motion

Unit Planner: Differential Equations
AP Calculus A/B

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus A/B (College Board AP) / Week 26 - Week 29

Last Updated: Monday, June 27, 2022 by Charlotte Cavataro

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)

- exponential growth and decay
- gravity

Generalization:
Exponential growth and decay and acceleration due to gravity can be modeled using differential equations.

Provocative:
Can a model be derived for the number of computers, *C*, infected by a virus, given a model for how fast the computers are being infected, *dC/dt*, at a particular time? (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:

- Solve differential equations
- Apply differential equations

Core Learning Activities

Solve differential equations

- Interpret verbal statements of problems as differential equations involving a derivative expression
- Verify solutions to a differential equation
- Estimate solutions to differential equations
- Determine general solutions to differential equations
- Determine particular solutions to differential equations

Apply differential equations

- Interpret the meaning of a differential equation and its variables in context
- Determine general and particular solutions for problems involving differential equations in context

Assessments

Exam Sample Question

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

Physics - Particle motion
Economics - Exponential growth and decay

Newtown Public Schools

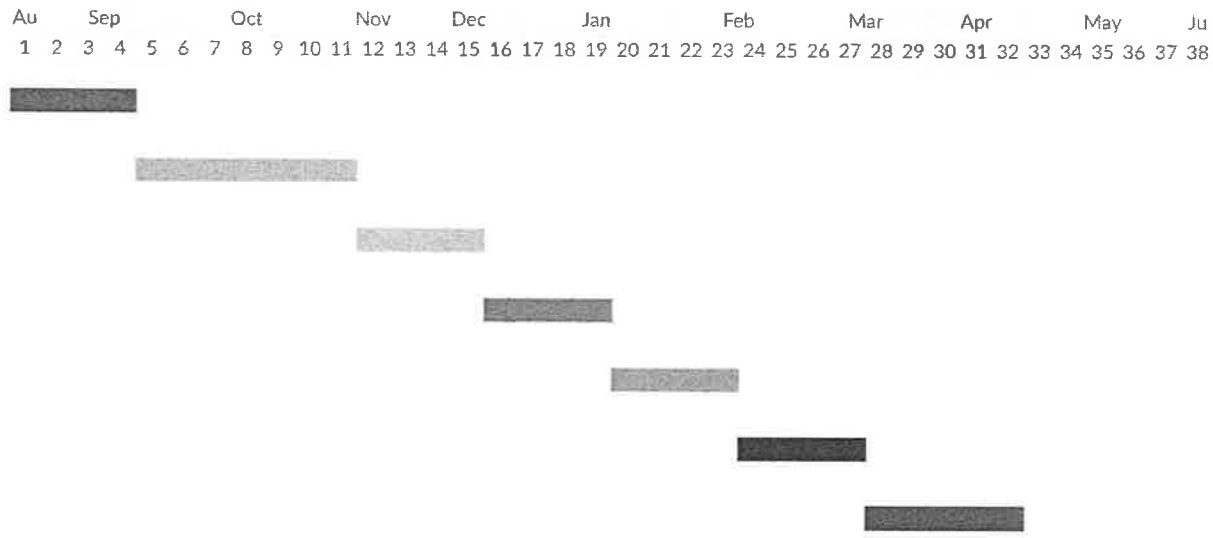
Atlas

AP Calculus B/C (College Board AP)

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

Unit Calendar by Year

Unit	Lessons
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

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus B/C (College Board AP) / Week 1 - Week 4

Last Updated: Tuesday, June 28, 2022 by Paige Hyman

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
- Differentiablity

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 • Differentiablity 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, 3:46 PM

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus B/C (College Board AP) / Week 5 - Week 11

Last Updated: Tuesday, June 28, 2022 by Paige Hyman

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 in 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)

• Related Rates • Particle Motion • L'Hopital's Rule 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.	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) 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)

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.

Assessments	Resources
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	*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	Interdisciplinary Connections
Information Literacy Critical Thinking Spoken Communication Written Performance	Farming, construction, architecture, business-Area, perimeter, volume

Unit Planner: Integration
AP Calculus B/C

Thursday, November 10, 2022, 3:47 PM

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus B/C (College Board AP) / Week 12 - Week 15

Last Updated: Tuesday, June 28, 2022 by Paige Hyman

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

- Reimann 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:

- Reimann Sum
- definite integrals
- area under a curve

Generalization:
A definite integral represents the area under a curve over a given interval.
Reimann 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)

- indefinite integration
- rules of integration
- Fundamental Theorem of Calculus

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.

Conceptual:
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)

Provocative:
How is it possible for the area of an unbounded region to be finite? (S2)

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

- Apply the Properties of Integrals
- Apply Riemann Sums
- Apply the Fundamental Theorem of Calculus

Core Learning Activities
Apply Riemann Sums

- Approximate areas under a curve using the sum of areas of basic geometric shapes.
- Interpret the limiting case of the Riemann sum as a definite integral.
- Represent the limiting case of the Riemann sum as a definite integral.

Apply the Fundamental Theorem of Calculus

- Connect the area under the graph of a functions derivative with the net change in the function.
- Solve Problems related to the motion of a particle along a line.

Apply the Properties of Integrals

- Apply basic integration rules to find the integral of a function.
- Use the inverse process of differentiation to find the antiderivative of functions.

Assessments
Exam Sample Questions

Resources
Professional & Student
AP Classroom
Department developed materials
online resources

Student Learning Expectation & 21st Century Skills

Interdisciplinary Connections

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

Tuesday, November 01, 2022, 3:48 PM

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus B/C (College Board AP) / Week 16 - Week 19

Last Updated: Tuesday, June 28, 2022 by Paige Hyman

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)

Definite integrals solve for areas between two curves and volumes of solids.	If the width of a rectangle is infinitesimally small is it still two dimensional? (S2)

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:

- Apply the Second Fundamental Theorem of Calculus in Real World problems
- Use integrals to solve for area under a curve and volume of solids

Core Learning Activities

Apply the Second Fundamental Theorem of Calculus in Real World problems

- determine the average value of a function using definite integrals
- determine values for positions and rates of change using definite integrals in problems involving rectilinear motions
- calculate areas in the plane using the definite integral

Use integrals to solve for area under a curve and volume of solids

- calculate volumes of solids with known cross sections using definite integrals
- calculate volumes of solids of revolution using definite integrals
- determine the length of a curve in the plane defined by a function, using a definite integral

## 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 Physics- particle motion

Unit Planner: Differential Equations
AP Calculus B/C

Thursday, November 10, 2022, 3:49PM

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus B/C (College Board AP) / Week 20 - Week 23

Last Updated: Tuesday, June 28, 2022 by Paige Hyman

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)

- exponential growth and decay
- gravity

Generalization:
Exponential growth and decay and acceleration due to gravity can be modeled using differential equations.

Provocative:
Can a model be derived for the number of computers, C, infected by a virus, given a model for how fast the computers are being infected, dC/dt, at a particular time? (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:

- Solve differential equations
- Apply differential equations

Core Learning Activities

Solve differential equations

- Interpret verbal statements of problems as differential equations involving a derivative expression
- Verify solutions to a differential equation
- Estimate solutions to differential equations
- Determine general solutions to differential equations
- Determine particular solutions to differential equations

Apply differential equations

- Interpret the meaning of a differential equation and its variables in context
- Determine general and particular solutions for problems involving differential equations in context

Assessments

Exam Sample Question

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

Physics - Particle motion
Economics - Exponential growth and decay

Unit Planner: Parametric, Polar, and Vector-Valued Functions
AP Calculus B/C

Thursday, November 10, 2022, 3:50 PM

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus B/C (College Board AP) / Week 24 - Week 27

Last Updated: Tuesday, June 28, 2022 by Megan Guarino

Parametric, Polar, and Vector-Valued Functions

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: 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)

Concepts:

- polar coordinates
- polar equation
- area between polar curves

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.

Provocative:
Can polar, parametric, and vector valued functions allow us to extend our knowledge to other applications? (S1/S2)

Standard(s)

Connecticut Core Standards / Content Standards

Critical Content & Skills

*What students must **KNOW and be able to DO***
Students will be able to:

- Apply methods for calculating derivatives of real-valued functions to parametric functions and polar curves
- Use definite integrals to determine regions defined by parametric functions and polar curves
- Determine values for positions and rates of change in problems involving planar motion

Core Learning Activities

Apply methods for calculating derivatives of real-valued functions to parametric functions and polar curves

- Calculate derivatives of parametric functions
- Calculate derivatives of vector-valued functions
- Calculate derivatives of functions written in polar coordinates

Use definite integrals to determine regions defined by parametric functions and polar curves

- Determine the length of a curve in the plane defined by parametric functions
- Calculate areas of regions defined by polar curves using definite integrals
- Determine a particular solution given a rate vector and initial conditions

Determine values for positions and rates of change in problems involving planar motion

- 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.

Assessments

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

Unit Planner: Infinite Sequences and Series
AP Calculus B/C

Thursday, November 10, 2022 3:53 PM

Newtown High School / 2022-2023 / Grade 12 / Mathematics / AP Calculus B/C (College Board AP) / Week 28 - Week 32

Last Updated: Tuesday, June 28, 2022 by Megan Guarino

Infinite Sequences and Series

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: 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 nth 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	Resources
Sample exam questions	*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-4*
Maureen Hall - *Supervisor of Intermediate Special Education, Gr. 5-8*
Dr. Paula Grayson - Supervisor of Secondary Special Education, Gr. 9-12 - ages 18-22

Newtown Public Schools currently has ***677*** *students who require Specialized Instruction (December 2,2022)*

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

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.

SAIL continued...

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 18-22 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 soley 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.

Naugatuck Valley Community College

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

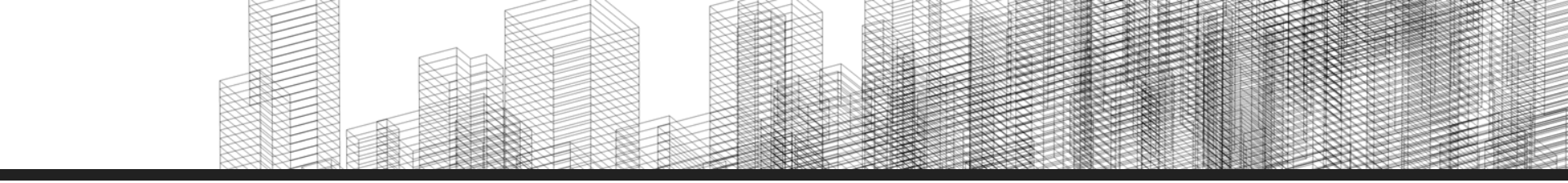
2021-2022

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)

Newtown Public Schools

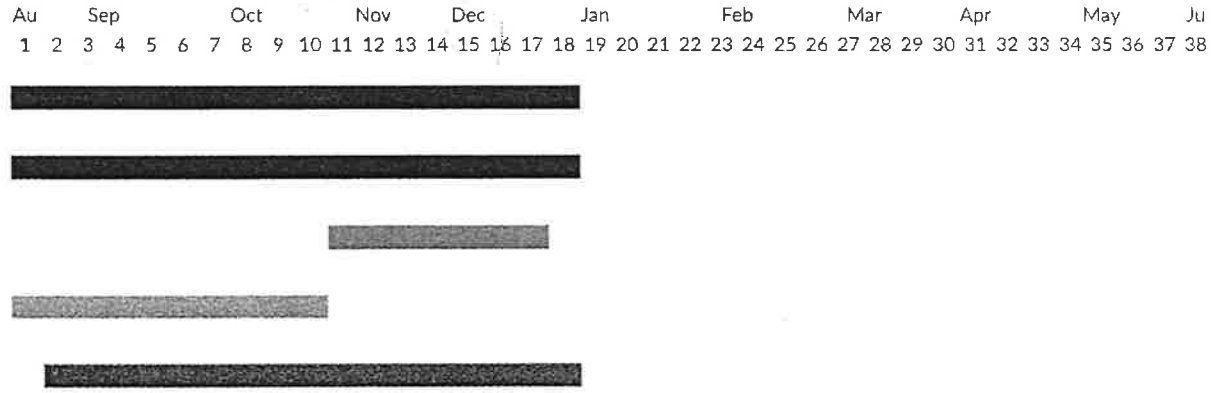
Atlas

Greenery (1 & 2)

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

Unit Calendar by Year

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

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

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.

Access the interactive version of the NGSS here

Critical Content & Skills

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

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

IPM (Integrated Pest Management)	Watering **Understand** Connections Between Insects/Fungi/Bacteria for Prevention & Control of Pests **Describe** Role of Insects: Beneficial Incests, 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

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	Resources *Professional & Student*
Planting Plugs/Liners Summative: Lab Assignment Planting Rubric	**Propagation** ** California Rare Fruit Growers - Plant Propagation Chart, Claude Sweet http://www.crfg.org/tidbits/proptable.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 ** 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 ** 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)

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

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.

Critical Content & Skills

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

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

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

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

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.

Critical Content & Skills

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

Topic	Content (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

		Environment
	Defend Identification of Host Plants, Indigenous Plants, Invasive Plants.	**Map** Host Plants, Indigenous Plants
	Discuss the relationship of Host Plants, Indigenous Plants, Invasive Plants.	**Remove** Invasive Plants
		Classify Plants with the Linnaeus System **Name** Plants Utilizing Binomial Nomenclature
Binomial Nomenclature	**Classify** Plants: Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species	**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

** PlantNative - Community Services Directory
Find national or regional organizations offering information about native plantings.
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, 2022, 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 ***Please identify the type of question: (F) Factual, (C) Conceptual, (P) Provocative [Debatable]***
1. Soil, a complex living ecosystem, comprises billions of organisms from thousands of species. 2. All plants - grass, trees, shrubs, agricultural crops - depend on the soil food web for their nutrition. 3. Microorganisms can only survive in optimal conditions. 4. Decomposition of organic	FACTUAL What is the soil food web? (G2) What is decomposition? (G5) What is a healthy ecosystem? (G1, G5) What is PH? (G3) What is moisture? (G3) What is temperature? (G3) What is air flow? (G3) What is symbiosis? (G2, G5) What roles do microorganisms play in the soil food web? (G2, G3) CONCEPTUAL What are optimal conditions for microorganism survival? (G3) How does soil quality impact plant survival? (G1, G3) How does PH Level effect soil and compost? (G3)

matter in soils is 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

Access the interactive version of the NGSS here

Critical Content & Skills

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

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

	are interdependent to one another in composting and decomposition.	temperature within the compost pile. **Identify** when it is appropriate to mix the contents of the pile according to temperature.
Elements and Minerals	**Identify** Micro/Macro Nutrients & **Indicate** Necessary Elements & Minerals: Nitrogen, Phosphorus, Potassium, Calcium, Sulfur, Magnesium, Iron, Manganese, Copper, Zinc, Boron, Chloride, Molybdenum **Monitor** environmental factors (PH, Moisture, Temperature, Air Flow) in nutrient uptake. **Explain** effects of environmental factors (PH, Moisture, Temperature, Air Flow) in nutrient uptake.	**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
Fungi	**Utilize** Mycorrhizal Fungi in soil and compost **Understand** complex interrelationship of plants & fungi **Describe** symbiotic relationship of fungi and plants	**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

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 Secrets3:59-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

** 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

** 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 illustration 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

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 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

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.

Access the interactive version of the NGSS here

Critical Content & Skills

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

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

D R A F T

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

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 11th. 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 7tt 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 21st. 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 9th. 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 9th. 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.

<u>Item 5 – Presentations</u>
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:

_____
Donald Ramsey
Secretary

NEWTOWN PUBLIC SCHOOLS
Newtown, Connecticut

ENROLLMENT REPORT AS OF November 30, 2022

	Current Monthly Enrollment				*Cumulative Year-to-Date*			
Grade	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
Special Education								
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
	=====	===	===	=====	=====	===	===	=====
ENROLLMENT BY SCHOOL								
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
Special Education								
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

check	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*

NEWTOWN PUBLIC SCHOOLS
Newtown, Connecticut

ELEMENTARY CLASS SIZES AS OF November 30, 2022

Grade	Hawley	Sandy Hook	Middle Gate	Head O' Meadow	Reed	TOTAL	check
Pre K		81				**81**	0
K							
	13	15	18	16			
	13	16	16	17			
	13	16	15	17			
		15	17	16			
Total K	**39**	**62**	**66**	**66**		**233**	0
1							
	17	16	15	17			
	17	16	18	19			
	18	17	18	19			
	17	17	18				
		18	18				
Total 1	**69**	**84**	**87**	**55**		**295**	0
2							
	20	15	17	17			
	19	17	17	17			
	19	18	14	17			
		18	17	17			
			18				
Total 2	**58**	**68**	**83**	**68**		**277**	0
3							
	21	20	19	20			
	20	19	20	21			
	19	19	20	21			
		18	20				
Total 3	**60**	**76**	**79**	**62**		**277**	0
4							
	21	18	17	18			
	21	17	19	20			
	21	20	19	20			
		18	19	20			
Total 4	**63**	**73**	**74**	**78**		**288**	0
Total K-4	**289**	**363**	**389**	**329**		**1,370**	0