Unit 5 Advanced Drone Systems and Data Collection 2021-2022

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Course(s): **Intro to Drone Flying**
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Title Section

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

INTRODUCTION TO DRONE FLYING, GRADES 10 TO 12

ADVANCED DRONE SYSTEMS AND DATA COLLECTION

Belleville Board of Education

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Board Approved:

Unit Overview

Upon completion of this section, please remove all remaining descriptions, notes, outlines, examples and/or illustrations that are not needed or used.

Please provide a Unit Overview that offers a brief introduction to the unit.

- What is the theme of the unit?
- What is the ideological direction of the unit?
- What is the topic of the unit?
- What will students learn from the unit?

Enduring Understanding

Upon completion of this section, please remove all remaining descriptions, notes, outlines, examples and/or ilustrations that are not needed or used.

Enduring understandings:

- Summarize important ideas and core processes that are central to a discipline and have lasting value beyond the classroom;
- Synthesize what students should understand - not just know or do - as a result of studying a particular content area;
- Frame the Big Ideas that give meaning and lasting importance to such discrete curriculum elements as facts and skills;
- Transfer to other fields and adult life;
- "Unpack" areas of the curriculum where students may struggle to gain understanding or where they demonstrate misunderstandings and misconceptions;
- Provide a conceptual foundation for studying the content area;
- Articulate what students should "revisit" over the course of their lifetimes in relationship to the content area;
- Are framed as declarative sentences that present major curriculum generalizatios and recurent ideas.

Examples:

- **Enduring Understanding**: Reading is a process by which we construct meaning about the information being communicated by an author within a print or non-print medium.

- **Essential Question**: How is reading a process for constructing meaning from text?

Essential Questions

Upon completion of this section, please remove all remaining descriptions, notes, outlines, examples and/or illustrations that are not needed or used.

Essential Questions are:

- Questions that lie at the heart of a subject or a curriculum;
- Questions that promotes inquiry and the discovery of a subject.

Essential Questions:

- Help students discover patterns in knowledge and solve problems;
- Support inductive teaching?guiding students to discover meaning, which increases motivation to learn;
- Are one of the most powerful tools for helping students think at more complex levels;
- Engage the personal intellect?something that traditional objectives usually fail to do;
- Have no obvious ?right? answer;
- Raise other important questions, across the curriculum in other content areas;
- Address a concept;
- Recur naturally and appropriately;
- Stimulate critical thinking, ongoing reflection and re-thinking;
- Are framed to provoke and sustain student interest.

What makes a Question "Essential"?

- Continues throughout all our lives
- Refers to core ideas and inquiries within a discipline
- Helps students effectively ask questions and make sense of important and complex ideas, knowledge, and know-how
- Engages a specific and diverse set of learners

Two Types of Essential Questions are:

Overaching ones:

- Include the "Big Idea"
- Are broader & generalized;
- Point beyond specific topics or skills;
- Promote the transfer of understanding.

Topical ones:

- Are specific to the unit or lesson specific;
- Guides individual units or lessons;
- Promotes inquiry;
- Resists obvious answers;
- Requires explanation and justification.

Examples:

- What is a true friend?
- What makes an artist amazing?
- In what sense is the body a system?
- What is the law of nature, and how is it like or unlike social laws?
- To what extent is U.S. history a history of progress?
- In what ways do diet and exercise affect health?

- Must heroes be flawless?
- How do effective writers hook and hold their readers?
- How do cultures affect one another?
- Does practice make perfect?
- What is healthy eating?
- What is healthy living?
- How and when do we use mathematics?
- How does something acquire value?

Exit Skills

Upon completion of this section, please remove all remaining descriptions, notes, outlines, examples and/or illustrations that are not needed or used.

What are the **Exit Skills** that the students should have acquired by the end of this Unit?

Examples:

By the end of Grade 1, ELA Unit 1, the student should be able to:

- Print his/her full name
- Identify/print capital letters
- Identify/print lowercase letters

New Jersey Student Learning Standards (NJSLS-S)

SCI.HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
SCI.HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
SCI.HS-PS2-2	Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.
SCI.HS-PS2-1	Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Interdisciplinary Connections

MA.K-12.5	Use appropriate tools strategically.
MA.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
MA.K-12.6	Attend to precision.
MA.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
LA.SL.11-12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
LA.L.11-12.6	Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
TECH.8.1.12.E.CS2	Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.

TECH.8.1.12.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.
TECH.8.1.12.F.1	Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
TECH.8.2.12.B.CS1	The cultural, social, economic and political effects of technology.
TECH.8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS2	Use and maintain technological products and systems.
TECH.8.2.12.E.4	Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).

Learning Objectives

Upon completion of this section, please remove all remaining descriptions, notes, outlines, examples and/or illustrations that are not needed or used.

Effective Learning Objectives Used in Lesson Planning:

- Begin with an action verb from one or more of Bloom's Taxonomy castegories listed below;
- Are measurable and/or observable, using action verbs, such as "differentiate," "classify," "justify;"
- Are not vague or passive verbs, such as "understand," "remember;"
- Increase the use of of verbs from Bloom's Taxonomy's higher order thinking categories, including **Analyze** and **Evaluate**
- Construct authentic learning activities and assessments that are derived from the Bloom's Taxonomy category - **Create**
- Minimize the use of lower order thinking categories - Remember and Understand.

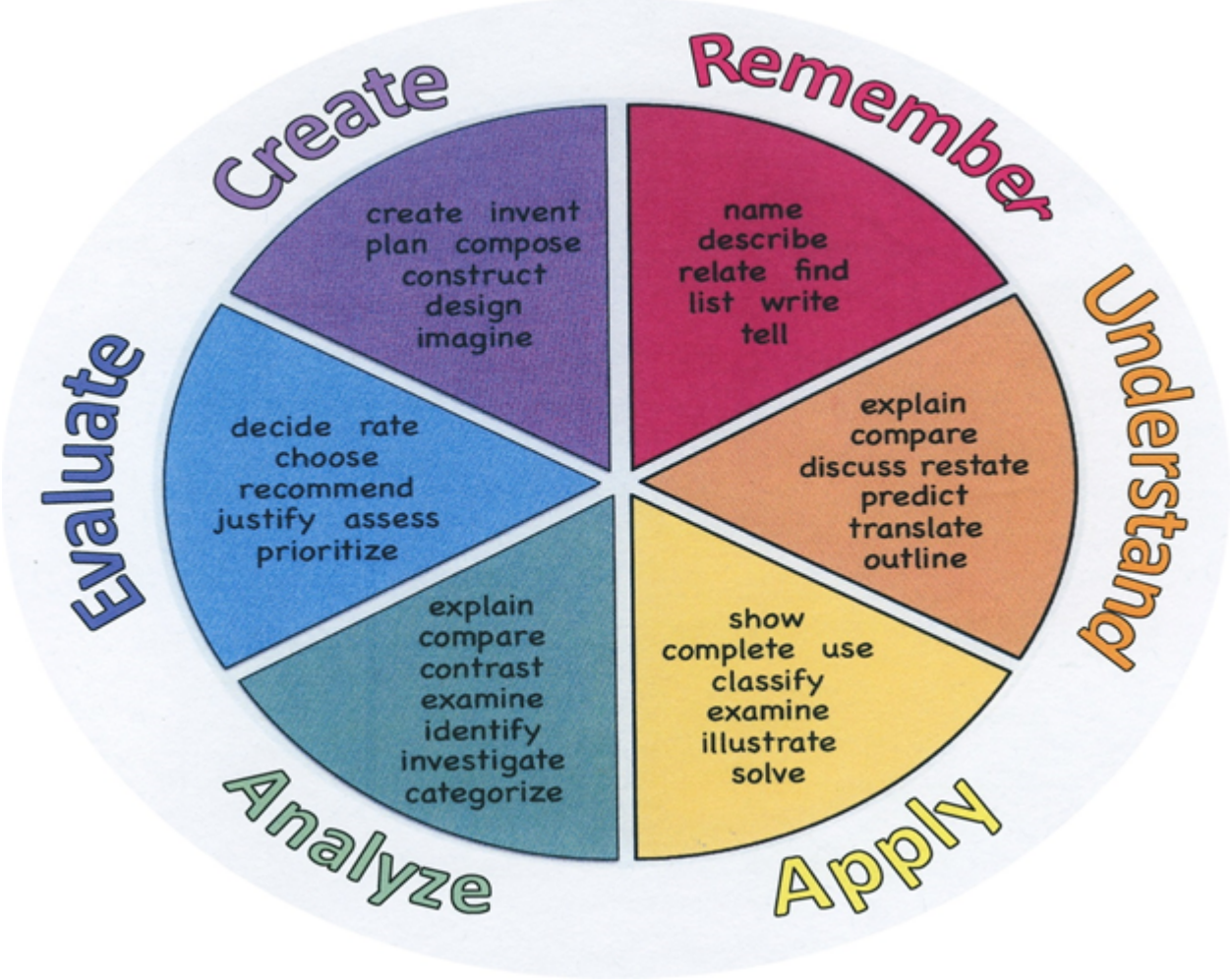
Examples:

- **Identify** nutrients found in common food sources using the product's nutrition label;
- Use computer dietary analysis to assess a 2-day dietary intake and **categorize** the results;
- **Research** nutrition-related information on the internet and **evaluate** the reliability of the information.

Action Verbs: Below are examples of action verbs associated with each level of the Revised Bloom's Taxonomy.

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose	Classify	Choose	Categorize	Appraise	Combine
Describe	Defend	Dramatize	Classify	Judge	Compose
Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive

Outline Point Quote Recall Recognize Repeat Reproduce	Represent Restate Rewrite Select Show Summarize Tell Translate Associate Compute Convert Discuss Estimate Extrapolate Generalize Predict	Calculate Change Classify Complete Compute Discover Divide Examine Graph Interpolate Manipulate Modify Operate Subtract	Diagram Discriminate Illustrate Outline Point out Separate	Support Test	Devise Generate Integrate Prescribe Propose Reconstruct Revise Rewrite Transform



Suggested Activities & Best Practices

Materials:

- Syma XSC-1 2.4G drone
- FS-i6S drone simulator

Best Practices:

- Use of scaffolded notes, where students fill in blanks
- Station activities, based on interest and level of understanding
- Hands-on activities to familiarize with parts of a drone and the control station
- Google Classroom organized around units of study

Supplemental Materials:

- faa.gov
- skyop.com
- Various part 107 test prep books
- www.dslrpros.com
- youtube.com
- https://jrupprechtlaw.com/part-107-knowledge-test#Part_107_Practice_Initial_Knowledge_Exam_Quiz

Assessment and Learning:

- edulastic.com
- whiteboard.fi/whiteboard.chat
- Jamboard
- Google Forms
- Google Classroom
- quizizz.com
- oncourse.com

Techniques:

- dronelegends.com
- youcanfly.aopa.org/high-school
- stem.org

Motivation and Mindset:

- www.dronedeploy.com
- www.pix4d.com
- helpx.adobe.com/
- store.dji.com/guides/10-common-mistake-mavic-pro-pilots-make/
- youtube.com (Drone Deploy, Tony & Chelsea Northrup, Pix4D, TECH DRONE MEDIA)

Assessment Evidence - Checking for Understanding (CFU)

- Edulastic Formative Assessment (Formative)
- quizizz.com - Teacher Made Topics (Formative)
- skyop.com online quizzes (Formative)
- Benchmarks on OnCourse (Summative/Benchmark)
- "Do Now/Exit Ticket" Activity (Formative)

- Admit Tickets
- Anticipation Guide
- Common Benchmarks
- Compare & Contrast
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Illustration
- Journals
- Learning Center Activities
- Multimedia Reports
- Outline
- Question Stems
- Quizzes
- Self- assessments
- Study Guide
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Unit review/Test prep
- Unit tests

- Web-Based Assessments
- Written Reports

Primary Resources & Materials

Upon completion of this section, please remove all remaining descriptions, notes, outlines, examples and/or illustrations that are not needed or used.

Please list all district-provided Primary Resources & Materials and/or those outside that are accessed with district resources.

Ancillary Resources

Upon completion of this section, please remove all remaining descriptions, notes, outlines, examples and/or illustrations that are not not needed or used.

Please list all additional resources that will be used to strengthen this unit's lessons.

Technology Infusion

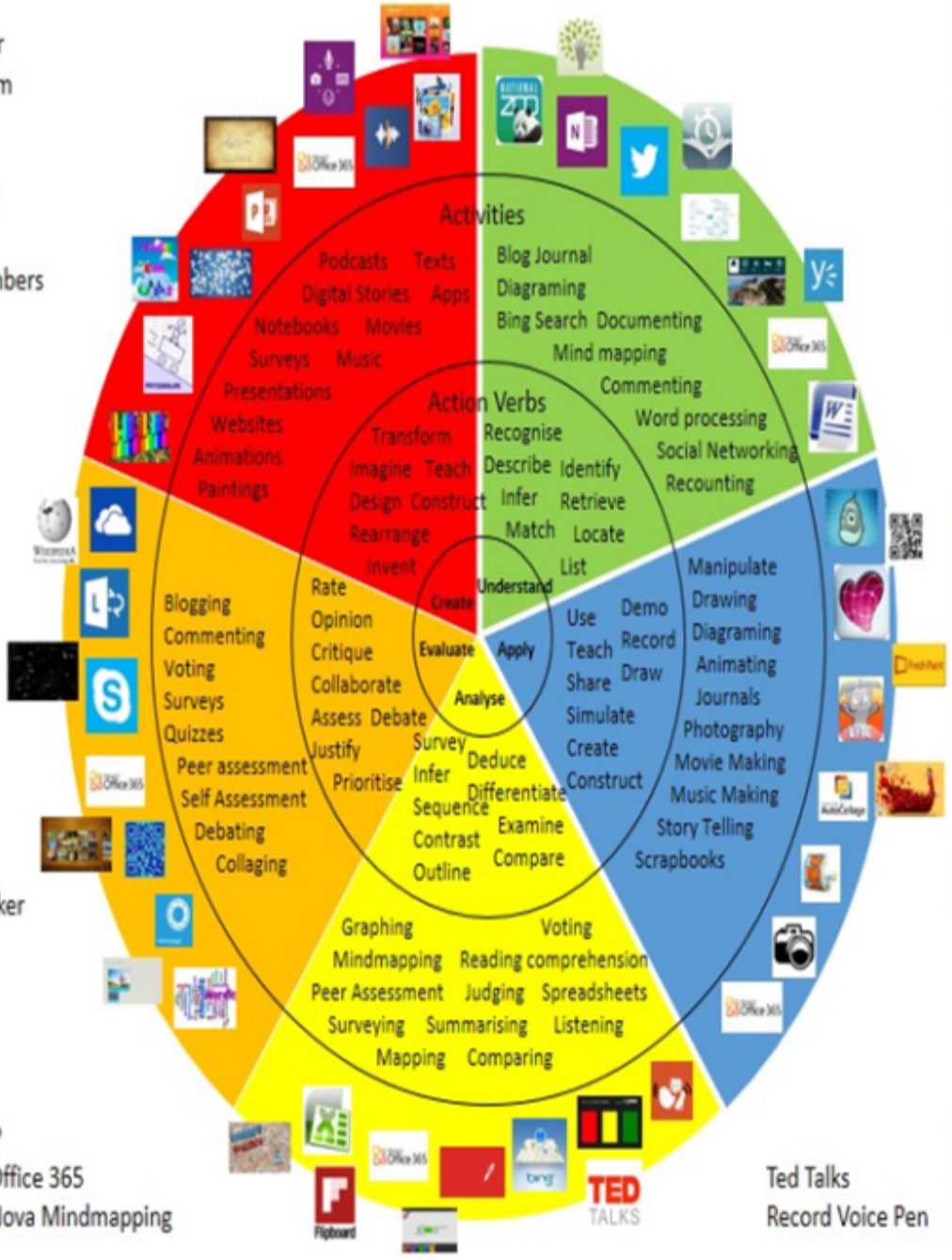
Upon completion of this sections, please remove all remaining descriptions, notes, outlines, examples and/or illustrations that are not needed or used.

What **Technology Infusion** and/or strategies are integrated into this unit to enhance learning? Please list all hardware, software and strategies. Please find a technology pedagogy wheel for assistance while completing this section.

Win 8.1 Apps/Tools Pedagogy Wheel

Podcasts
Photostory 3
Kid Story Builder
Music Maker Jam
Paint A Story
Office 365
MS PowerPoint
Stack 'Em Up
NqSquared Numbers
Physamajig
Xylophone 8

Wikipedia
Skydrive
Lync
SkyMap
Skype
Office 365
Puzzle Touch
Easy QR
Memorylage
Life Moments
Word Cloud Maker



Where's Waldo?
MS Excel Office 365
Flipboard Nova Mindmapping

Ted Talks
Record Voice Pen

Originally taken from http://www.coetail.com/vzimmer/files/2013/02/iPadagogy-Wheel.001.jpg
And adapted for Windows 8.1 devices by Charlotte Beckhurst @CharBeckhurst

Alignment to 21st Century Skills & Technology

Upon completion of this section, please remove all remaining descriptions, notes, outlines, examples and/or illustrations that are not needed or used.

Mastery and infusion of **21st Century Skills & Technology** and their Alignment to the core content areas is essential to student learning. The core content areas include:

- English Language Arts;
- Mathematics;
- Science and Scientific Inquiry (Next Generation);
- Technology;

21st Century Skills/Interdisciplinary Themes

Please list only the **21st Century/Interdisciplinary Themes** that will be incorporated into this unit.

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Life and Career Skills
- Media Literacy

21st Century Skills

Please list only the **21st Century Skills** that will be incorporated into this unit.

- Civic Literacy
- Environmental Literacy
- Financial, Economic, Business and Entrepreneurial Literacy

Differentiation

Differentiations:

- Small group instruction
- Small group assignments
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Center-based instruction
- Study guides
- Teacher reads assessments allowed
- Scheduled breaks
- Rephrase written directions
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts
- Behavior management plan
- Highlight text
- Student(s) work with assigned partner
- Visual presentation
- Assistive technology
- Auditory presentations
- Small group setting

Hi-Prep Differentiations:

- Alternative formative and summative assessments
- Choice boards
- Games and tournaments
- Learning contracts
- Leveled rubrics
- Multiple intelligence options
- Project-based learning
- Problem-based learning
- Stations/centers
- Tiered activities/assignments
- Tiered products

Lo-Prep Differentiations

- Choice of books or activities
- Flexible grouping
- Goal setting with students
- Mini workshops to re-teach or extend skills
- Open-ended activities
- Think-Pair-Share
- Varied journal prompts
- Varied supplemental materials

Special Education Learning (IEP's & 504's)

- printed copy of board work/notes provided
- additional time for skill mastery
- assistive technology
- behavior management plan
- Center-Based Instruction
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- multi-sensory presentation
- multiple test sessions
- preferential seating
- preview of content, concepts, and vocabulary
- Provide modifications as dictated in the student's IEP/504 plan
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

English Language Learning (ELL)

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarify
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student’s learning;
- allowing students to correct errors (looking for understanding)

- allowing the use of note cards or open-book during testing
- decreasing the amount of work presented or required
- having peers take notes or providing a copy of the teacher's notes
- providing study guides
- tutoring by peers
- using computer word processing spell check and grammar check features

At Risk

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.
- decreasing the amount of work presented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- providing study guides
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using videos, illustrations, pictures, and drawings to explain or clarify

Talented and Gifted Learning (T&G)

- Above grade level placement option for qualified students
- Advanced problem-solving
- Allow students to work at a faster pace
- Cluster grouping
- Complete activities aligned with above grade level text using Benchmark results
- Flexible skill grouping within a class or across grade level for rigor
- Higher order, critical & creative thinking skills, and discovery
- Multi-disciplinary unit and/or project
- Teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- Utilize exploratory connections to higher-grade concepts
- Utilize project-based learning for greater depth of knowledge

Sample Lesson

Using the template below, please develop a **Sample Lesson** for the first unit only.

Unit Name:

NJSLS:

Interdisciplinary Connection:

Statement of Objective:

Anticipatory Set/Do Now:

Learning Activity:

Student Assessment/CFU's:

Materials:

21st Century Themes and Skills:

Differentiation/Modifications:

Integration of Technology: