Solar powered Race cars

Content Area: **Science**
Course(s): **CP Introduction to Engineering**
Time Period: **Marking Period 1**
Length: **3-4 weeks**
Status: **Published**

Course Pacing Guide

Unit	MP/Trimester	Weeks
Solar Powered Race Cars	1	3
CAD Design and 3D Printing	1	2
Wind Turbines	1	3
Robotics	1	3
Bridges	2	4
Environmental Engineering	2	3
Final Paper	2	2

SCI.9-12.5.1.12.A	Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.
SCI.9-12.5.1.12.B.2	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
9-12.HS-ETS1	Engineering Design
9-12.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.
9-12.HS-ETS1-1.ETS1.A	Defining and Delimiting Engineering Problems
9-12.HS-ETS1-2.ETS1.C	Optimizing the Design Solution

Unit Overview

Solar Powered Race Cars

Program Description

• Students use mathematics and science principles together with their creativity in a fun, hands-on educational program

• Using engineering principles, students get excited about generating ideas in a group and then building and modifying models based on these ideas

• Students can see for themselves how changes in design are reflected in car performance

Enduring Understandings

JSS challenges students to use scientific know-how, creative thinking, experimentation, and teamwork to design and build high-performance model solar vehicles.

Essential Questions

New Jersey Student Learning Standards (No CCS)

Amistad Integration

Remove/replace the text in this section - this is for your reference (link -- https://nj.gov/education/amistad/about.htm)

Purpose:

> The Amistad Commission ensures that the Department of Education and public schools of New Jersey implement materials and texts which integrate the history and contributions of African-Americans and the descendants of the African Diaspora.

Goals:

1) To infuse the history of Africans and African-Americans into the curriculum in order to provide an accurate, complete and inclusive history.

2) To ensure that New Jersey teachers are equipped to effectively teach the revised social studies core curriculum content standards.

3) To create and coordinate workshops, seminars, institutes, memorials and events which raise public

awareness about the importance of the history of African-Americans to the growth and development of American society in global context.

Holocaust/Genocide Education

Remove/replace the text in this secion - this is for your reference (link -- https://nj.gov/education/holocaust/about_us/mandate.html)

RE: N.J.S.A. 18A:35-28, Holocaust/Genocide Education

a. Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils.

b. The instruction shall enable pupils to identify and analyze applicable theories concerning human nature and behavior: to understand that genocide is a consequence of prejudice and discrimination: and to understand that issues of moral dilemma and conscience have a profound impact on life. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

Interdisciplinary Connections

List at least one specific standard

No general statements

SCI.9-12.HS-LS1-3.3	Planning and carrying out in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.
SEL.PK-12.1.4	Recognize the importance of self-confidence in handling daily tasks and challenges

Technology Standards

List specific standards that are relevant
No general statements

21st Century Themes/Careers

List specific standards that are relevant
No general statements

Financial Literacy Integration

Remove/replace the text in this section - this is for your reference -- (link to helpful resources: https://www.nj.gov/education/aps/cccs/career/FLResources.pdf)

An Act concerning public school instruction on financial literacy and supplementing chapter 35 of Title 18A of the New Jersey Statutes.

Be It Enacted by the Senate and General Assembly of the State of New Jersey:

1. The State Board of Education shall require that a school district incorporate in each of the grades [1][kindergarten] six[1] through eight financial literacy instruction to pupils enrolled in those grades. The purpose of the instruction shall be to provide [1][elementary and][1]middle school students with the basic financial literacy necessary for sound financial decision-making.

The instruction shall meet the requirements established by the State board and shall:

a. be appropriate to, and reflect the age and comprehension of, the students enrolled in the particular grade level; and

b. include content on budgeting, savings, credit, debt, insurance, investment, and other issues associated with personal financial responsibility as determined by the State board.

Instructional Strategies & Learning Activities

Differentiated Instruction

Examples may include:

- Curriculum Map
- Inquiry/Problem-Based Learning
- Learning preferences integration (visual, auditory, kinesthetic)
- Sentence & Discussion Stems
- Tiered Learning Targets
- Learning through play
- Meaningful Student Voice & Choice
- Relationship-Building & Team-Building
- Self-Directed Learning
- Choice Boards
- Debate
- LMS use
- Mock Trial

- The Hot Seat/Role-Play
- Student Data Inventories
- Mastery Learning (feedback toward goal)
- Goal-Setting & Learning Contracts
- Game-Based Learning
- Grouping
- Socratic Seminar
- Genius Hour
- Rubrics
- Learning Menus
- Jigsaws
- Learning Through Workstations
- Concept Attainment
- Flipped Classroom
- Mentoring
- Assessment Design & Backwards Planning
- Student Interest & Inventory Data

*Add or remove any of these as you see fit.

Formative Assessments

Summative Assessment

Benchmark Assessments

Alternate Assessments

Resources & Technology

BOE Approved Texts

Closure

Such as:

- Snowstorm - Students write down what they learned on a piece of scratch paper and wad it up. Given a signal, they throw their paper snowballs in the air. Then each learner picks up a nearby response and reads it aloud.
- Parent Hotline - Give students an interesting question about the lesson without further discussion. Email their guardians the answer so that the topic can be discussed over dinner.
- DJ Summary - Learners write what they learned in the form of a favorite song. Offer to let one or two sing thier summary.
- Gallery Walk - On chart paper, small groups of students write and draw what they learned. After the completed works are attached to the classroom walls, others students affix post-its to the posters to extend on the ideas, add questions.
- Sequence It - create timelines of major events discussed
- Low-Stakes Quizzes - Give a short quiz using technologies like Kahoot or a Google form.
- Have students write down three quiz questions (to ask at the beginning of the next class).
- Question Stems - Have students write questions about the lesson on cards, using question stems framed around Bloom's Taxonomy. Have students exchange cards and answer the question they have acquired.
- Kids answer the following prompts: "What takeaways from the lesson will be important to know three years from now? Why?
- Have students dramatize a real-life application of a skill.
- Ask a question. Give students ten seconds to confer with peers before you call on a random student to answer. Repeat.
- Have kids orally describe a concept, procedure, or skill in terms so simple that a child in first grade would get it.
- Direct kids to raise their hands if they can answer your questions. Classmates agree (thumbs up) or disagree (thumbs down) with the response.
- Have kids create a cheat sheet of information that would be useful for a quiz on the day's topic.
- Kids write notes to peers describing what they learned from them during class discussions.
- Ask students to summarize the main idea in under 60 seconds to another student acting as a well-known personality who works in your discipline. After summarizing, students should identify why the famous person might find the idea significant.
- Have students complete the following sentence: "The [concept, skill, word] is like _____ because _____."
- Ask students to write what they learned, and any lingering questions on an "exit ticket". Before they leave class, have them put their exit tickets in a folder or bin labeled either "Got It," "More Practice, Please," or "I Need Some Help!"
- After writing down the learning outcome, ask students to take a card, circle one of the following options, and return the card to you before they leave: "Stop (I'm totally confused. Go (I'm ready to move on.)" or "Proceed with caution (I could use some clarification on . . .)"

*Add to or remove any of these as you see fit.

ELL

Such as:

- Alternate Responses
- Advance Notes
- Extended Time
- Teacher Modeling
- Simplified Written and Verbal Instructions
- Frequent Breaks
- E-Dictionaires
- Google Translate

*Add to or remove any of these as you see fit.

Special Education

List is not inclusive but may include examples such as:

- Shorten assignments to focus on mastery of key concepts.
- Shorten spelling tests to focus on mastering the most functional words.
- Substitute alternatives for written assignments (clay models, posters, panoramas, collections, etc.)
- Specify and list exactly what the student will need to learn to pass.
- Evaluate the classroom structure against the student's needs (flexible structure, firm limits, etc.).
- Keep workspaces clear of unrelated materials.
- Keep the classroom quiet during intense learning times.
- Reduce visual distractions in the classroom (mobiles, etc.).
- Provide a computer for written work.
- Seat the student close to the teacher or a positive role model.
- Use a study carrel. (Provide extras so that the student is not singled out.)
- Provide an unobstructed view of the chalkboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.
- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.
- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Provide a vocabulary list with definitions.
- Permit as much time as needed to finish tests.
- Allow tests to be taken in a room with few distractions (e.g., the library).
- Have test materials read to the student, and allow oral responses.
- Divide tests into small sections of similar questions or problems.
- Allow the student to complete an independent project as an alternative test.

- Give progress reports instead of grades.
- Grade spelling separately from content.
- Allow take-home or open-book tests.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).
- Stand near the student when giving directions or presenting a lesson.
- Mark the correct answers rather than the incorrect ones.
- Permit a student to rework missed problems for a better grade.
- Average grades out when assignments are reworked, or grade on corrected work.
- Use a pass-fail or an alternative grading system when the student is assessed on his or her own growth.

*Add to or remove any of these as you see fit.

504

Examples of accommodations in 504 plans include but are not limited to:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

*Add to or remove any of these as you see fit.

At Risk

Examples may include:

- Use of mnemonics
- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Use of a study carrel
- Assistance in maintaining uncluttered space
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Peer or scribe note-taking
- Lab and math sheets with highlighted instructions
- Graph paper to assist in organizing or lining up math problems

- Use of manipulatives
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills
- Verbal and visual cues regarding directions and staying on task
- Adjusted assignment timelines
- Visual daily schedule
- Immediate feedback
- Work-in-progress check
- Pace long-term projects
- Preview test procedures
- Film or video supplements in place of reading text
- Pass/no pass option
- Cue/model expected behavior
- Use de-escalating strategies
- Use peer supports and mentoring
- Have parent sign homework/behavior chart
- Chart progress and maintain data

*Add to or remove any of these as you see fit.

Gifted and Talented

Focus on effort and practice

Offer the Most Difficult First

Offer choice

Speak to Student Interests

Allow G/T students to work together

Encourage risk taking