New Fellow Education Transfer Plan
Cover Sheet

Title of ETP	Program Management
Name of IISME Fellow	John E. Haynes II
Fellow's year-round email	jhaynes@rcsd.k12.ca.us
Sponsor Company	Lockheed Martin
Name of Mentor	Craig Brumbaugh
National Board Certificate Area	Early Adolescence through Young Adulthood/Career and Technical Education

I, the IISME **Fellow** named above, affirm that the ETP I am submitting is my own work, that I acknowledged sources where appropriate, and that I avoided including any proprietary information of the Sponsor Company. By my submission I am assigning to IISME my entire copyright in the ETP. I understand IISME is simultaneously granting me a license to use the ETP for pedagogical purposes.

Signature _____ Date _____

Category	*Curriculum* Subject: **MATH SCIENCE TECHNOLOGY LITTERATURE** Level: **MIDDLE**

Abstract (50 words or less)	The purpose of this lesson is to develop efficient management skills that can be used in all aspects of life. To begin, the students will be divided into groups of 4-5, and asked to create a product proposal. The product should (but is not confined to) represent something that can be engineered, such as an airplane, satellite, building, etc. They will then begin to develop a schedule to accomplish all tasks, by a given deadline. The materials for the product must be well researched (cost, availability, labor . . .), and a plan developed based on this information. The plan should include the group's research, a sample of the product (The sample can be a model or scale drawing, if the project is to large or costly.), task definitions and duration of the project, perspective costs of labor and materials. This proposal would then be presented (Power Point) to a group of investors, who are being asked to finance the project. The emphasis of this activity is on dividing the overwhelming amount of work into smaller more manageable categories and accomplishing these tasks in accordance to the schedule set forth by the group at the beginning of the project. As students notice certain tasks are interdependent they will realize the importance of a detailed schedule and group work.
Teaching Standards	*Career and Technical Education*: Creating a Productive Learning Environment, Advancing Student Learning, Helping Students Transition to Work and Adult Roles, Improving Education through Professional Development and Outreach
Student Standards	*Math* - Algebra and Functions: 1.0 – 1.5 and 3.0, 3.1, 3.3, 3.4; Measurement and Geometry: 1.0 – 1.3; Mathematical Reasoning: 1.0 – 1.3 and 2.0 – 2.8 and 3.0 – 3.4 *Science* - Investigation and Experimentation: 9, a - g

Objectives	The students will be able to effectively plan and design a particular product of their choosing. They will also, and most importantly, be able to manage a schedule to ensure that the project is completed by the deadline. The proper use of group organization and cooperation skills are a vital objective, as well.
Describe how your ETP aligns with the National Board Standard stated in your proposal.	The standards stated will be met by this ETP, by providing the students with proper knowledge of the adult working environment as observed first hand during the fellowship. Also, by providing the students an environment that will support their growth, by supplying adequate resources, such as computers and drafting tools. And, will encourage students to seek information from actual industry employees, to gain a further understanding of working life.
Describe the connection between your ETP and the Summer Fellowship.	During my summer fellowship at Lockheed Martin, I worked in the business department for SBIRS satellite program. In the business department I worked closely with the program managers and schedulers. I learned that a major component in business is the management of time. The time either saved or wasted, determines the amount money received. Good program management assures that a task will be completed efficiently and on time without skipping even the minutest details.
Resources Needed	Library Reference Materials, Geometric Tools (for design), Computer (Power Point, Word, Internet . . .)
Evaluation/Assessment Measures Used	Students will be assessed on: the completion of tasks, on time, as specified by their schedule; the detail and quality of the research; the impact of proposal; and, overall creativity of the project.
Formatting specifications	PC __x_ or Mac _x_ **(Must be in Word or Text Format)** Software used _Power Point, Word, Excel
Submitted Copy	Soft and hard copy due to peer coach by the end of the summer fellowship. Also, a copy of the cover sheet signed by a school site administrator submitted to IISME Oct.3, 2004 to receive $300 grant.

I, the **Mentor** named above [please select one of the following],

- ❑ have read the attached ETP, and my comments, if any, appear below.
- ❑ have read the attached ETP, and, as outlined in the IISME-Company Fellowship Agreement, have reviewed it on behalf of the Sponsor Company, and have determined that the ETP does not contain any Sponsor-proprietary information. My additional comments, if any, appear below.

Comments:

Signature Date

Administrator's comments:

Signature Date

Program Management

Fellow: John Haynes

Sponsor Company: Lockheed Martin

Integrated Curriculum

Middle Years

Time: about 1.5 months (in/out of class)

Teaching Standards

Career and Technical Education: Creating a Productive Learning Environment, Advancing Student Learning, Helping Students Transition to Work and Adult Roles, Improving Education through Professional Development and Outreach

Student Standards

Math - Algebra and Functions: 1.0 – 1.5 and 3.0, 3.1, 3.3, 3.4; Measurement and Geometry: 1.0 – 1.3; Mathematical Reasoning: 1.0 – 1.3 and 2.0 – 2.8 and 3.0 – 3.4

Science - Investigation and Experimentation: 9, a - g

Abstract

The purpose of this lesson is to develop efficient management skills that can be used in all aspects of life. To begin, the students will be divided into groups of 4-5, and asked to create a product proposal. The product should (but is not confined to) represent something that can be engineered, such as an airplane, satellite, building, etc. They will then begin to develop a schedule to accomplish all tasks, by a given deadline. The materials for the product must be well researched (cost, availability, labor . . .), and a plan developed based on this information. The plan should include the group's research, a sample of the product (The sample can be a model or scale drawing, if the project is to large or costly.), task definitions and duration of the project, perspective costs of labor and materials. This proposal would then be presented (Power Point) to a group of investors, who are being asked to finance the project.

The emphasis of this activity is on dividing the overwhelming amount of work into smaller more manageable categories and accomplishing these tasks in accordance to the schedule set forth by the group at the beginning of the project. As students notice certain tasks are interdependent they will realize the importance of a detailed schedule and group work.

Most of the project is to be done out side of class; with some allotted time during class, as well, for weekly progress evaluation.

Objectives

The students will be able to effectively plan and design a particular product of their choosing. They will also, and most importantly, be able to manage a schedule to ensure that the project is completed by the deadline. The proper use of group organization and cooperation skills are a vital objective, as well.

Prior Knowledge

This lesson was created with high achieving students, in a Pre-Algebra or Algebra class, in mind. These students have knowledge of or have competed in a science fair or other design competition, in the past (knowledge of the scientific method and creating long term projects). The students also understand the dynamics of cooperative group performance, and the roles of each participant.

Resources

Library Reference Materials, Geometric Tools (for design), Computer (Power Point, Word, Internet . . .)

Task I – Concept Development

Objective: Students will brainstorm and research possible design ideas, with assistance from the teacher, who will provide guidance questions.

Skills: Collaborative group work, Brainstorming

Procedure:

1. Divide the class into groups of four
2. Explain to the students that "this is a lesson in program management." And, that their job is "to implement a plan in which to create and present a product to sell to a group of "investors" (classmates and teacher), by a specified deadline. A detailed schedule needs to be planned and followed throughout the project, and may be readjusted at any time to account for task not foreseen."
3. Once grouped, the students should be given an opportunity to think of as many projects as possible. [Ideas: Building (Apartment, Department Store, . . .), Clothing (Shoe, Dress . . .), Vehicles (Plane, Boat . . .), Space (Rocket, Satellite . . .); etc.]
4. The group will collect all ideas and agree on a project.

Guiding Questions

A. What activities are interesting?

B. How can these activities be intensified through invention?

C. What would make a design stand out and be noticed?

D. What is the purpose of the design/Who does it service?

E. How can the audience gain enthusiasm about the design?

F. Which ideas are more feasible?

Notice: These questions are fairly vague and highly general and may not address all design ideas. All guiding questions in this lesson are designed to do just that, *guide*; and not be considered as concrete law.

Creating the Program Schedule

Objective: Create a program schedule, including all considerable details, regardless of the tasks' levels of importance (e.g. vote on design sketch, should be included).

Skills: Power Point, Excel, Computer

Procedure:

1 Given the seven general tasks, the student will begin to design a work/production schedule.

Tasks

a. Brainstorm
b. Design Sketch
c. Research (History)
d. Research (Materials)
e. Detailed Sketch
f. Research (Costs)
g. Proposal

2 It is important, when preparing a schedule, to consider the known deadlines, and adjust the time accordingly.
3 Consider the prospective length of each task and propose a starting and ending date.
4 Although Brainstorming occurs prior to scheduling, it should also be included in the plan.

Notice: Only the general topics are provided. It is up to each group to determine the subtopics required for implementing these tasks. (e.g. What information is necessary to complete the research?)

The scheduling tool used in the industry is called Real Time Projects by AMS

Guiding Questions

A. How long will each task take?

B. Who is responsible for each task?

C. Did you account for risk?

- Risks are any possible failures that may result in the offsetting of the schedule (e. g. sick, vacation, poor research).
- To account for risk a margin is provided. The margin is extra time assigned to each task in case of any un-foreseen mishaps. There are three main types of margins:
    - General Margin: assigned to each task
    - Float: a large margin that allows a small task to be completed any time during the specified dates.
    - Trailing Margin: The extra time that has accumulated at the end of a project.
- Another way risk is accounted for is through mitigation. Mitigation is the creation of alternate plan "just in case" things don't go according to the original plan. ("Plan B")
- Single Point Failure happens when a task is not completed and only one source is responsible for the task, due to poor mitigation.

D. Does the task have any predecessors or successors?

- A predecessor is a task that must be completed before the next task has begun.
- A successor, consequently, is a task that cannot begin until the previous task is completed.
- This is referred to as the critical path, tasks that depend on one another.

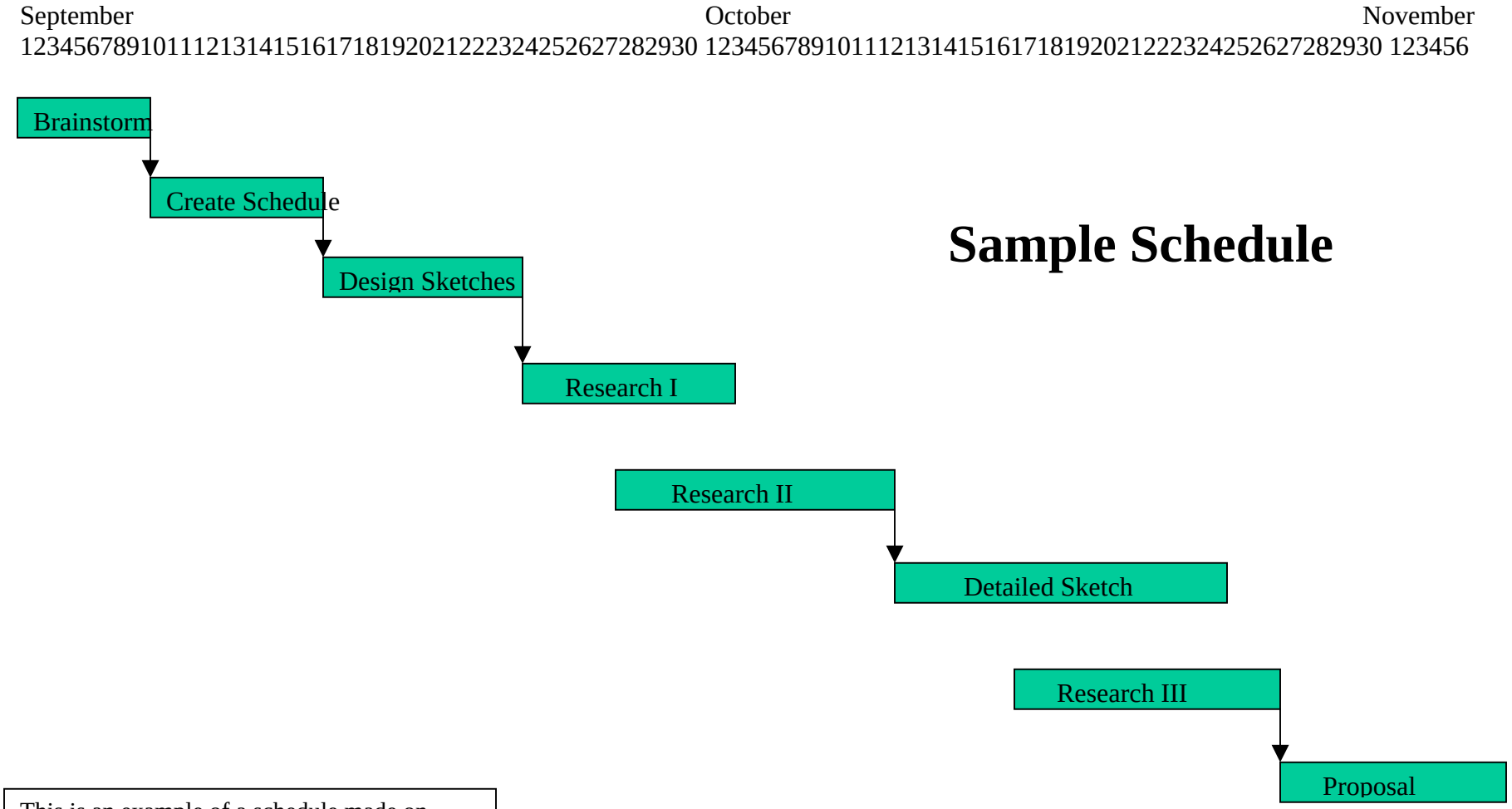
E. Are there progress meetings scheduled? (e.g. Every Thursday update progress)?

CAUTION: Do not leave the schedule vague. Large time for and between tasks usually leads to problems. Because, most tasks are usually a combination of smaller tasks, leaving out steps may result in incomplete tasks and overall errors in the outcome. Again, be as detailed as possible. If it feels like there are too many things on the schedule, then there are probably not enough.

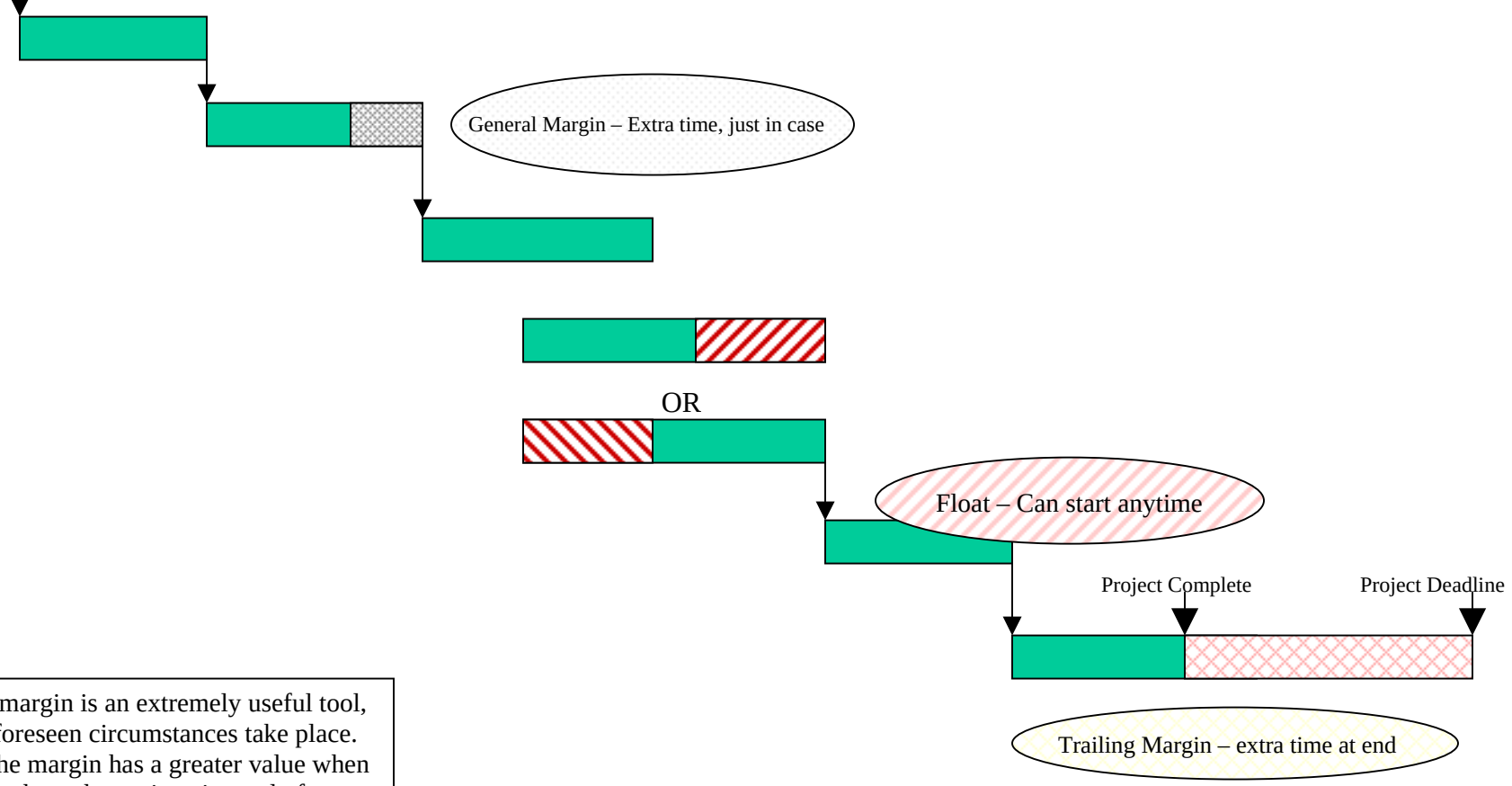
Remember: This is a lesson in program management, so the schedule is the most important part of the project.

Additionally: There will be opportunities, in which the schedule needs to be readjusted to account for un-foreseen circumstances and to meet deadlines set by the group and the project itself.

Sample Schedule



This is an example of a schedule made on power point. Arrows linking the tasks have illustrated the critical path. Notice: Some tasks are not linked; this means that they may be started independent of their predecessors.



Setting the margin is an extremely useful tool, in case un-foreseen circumstances take place. However, the margin has a greater value when placed throughout the project, instead of saving it till the end. *Remember*: The best plans have the greatest details

Key

Production Time

Teaching Tips

Prior to teaching about scheduling and planning, I normally begin the year with a *daily activities schedule* planning lesson.

Objective: Design a schedule to account for all weekly activities, so that ample time may be spent on schoolwork without compromising recreational activities or sleep.

Skills: Time management, Competency Mathematics

Procedure:

First the students outline their basic daily activities

Be certain to include <u>every</u> daily activity. (e. g. school, bathroom, breakfast, sleep, recreation, etc)

Then they assign each task a time of day and duration.

Sample Schedule

Here is an example of a typical weekly activities schedule. Some students may have more details; however, they should cover these basics.

Normally Saturday and Sunday are included as well, as Sunday is a school night.

Time	Monday	Tuesday	Wednesday	Thursday	Friday
			SLEEP		
	Bathroom (Get Ready for School)				
	Breakfast				
			School		
	Practice	Homework	Practice	Homework	Practice
	Homework		Homework		Homework
			Dinner		
	Television/Video Games				

Task II - Design Sketch (Draft**)**

Objective: This sketch is to get an initial understanding of the design implications involved in creating the chosen project.

The sketch does not have to include dimensions (measurements), but should be as detailed as possible to aid in obtaining the necessary information during research.

Skills: Ratios, Proportions and Scale Drawings

Procedure: To be determined by the group of students.

Task III – Research (History**)**

Objective: Research how similar productions are created in the industry.

Skills: Research (Library References and Internet)

Procedure: To be determined by the group of students.

Guiding Questions

A. Where was the product made?

B. How was the product created (steps)?

C. What materials were used?

D. How long did the project take to complete?

E. How many people were needed to construct the product?

Task IV – Research II (Materials**)**

Objective: After the initial research, the materials to be used can be determined.

The students will research the desired materials, to determine the efficiency of each material. *Consult the physical science teacher about material efficiency.*

Once the possible materials have been researched, the group can decide which materials best fit the project's needs.

Skills: Research (Library References and Internet)

Procedure: To be determined by the group of students.

Remember: Not all materials are chosen because of their strength and durability. Some materials do not have practical strength, however are chosen due to their beauty. (e.g. Gold and Silver).

Task V – Detailed Sketch (Draft II**)**

Objective: The students will illustrate the project using a detailed sketch; being certain to include: measurements, materials, colors, etc.

Prior Knowledge: Some general knowledge of mechanical drafting is required.
A possible review of this topic may be necessary, prior to Task V

Skills: Ratios, Proportions and Scale Drawings.

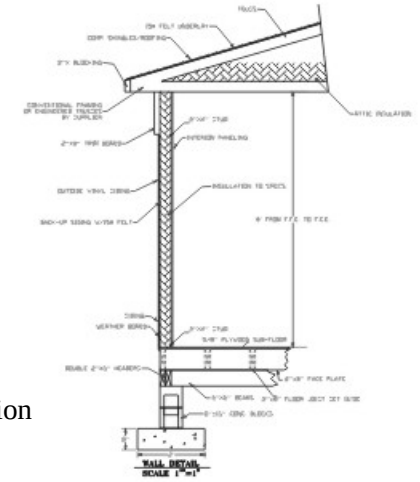
Procedure: To be determined by the group of students.

Additionally: More than one angle and cross sections (if necessary) should be provided as part of the detailed sketch.

Architectural

Details

Cross Sections: show details of the house as though it were cut in slices from the roof to the foundation. The cross sections specify the home's construction, insulation, flooring and roofing details.



Cross Section

Exterior Elevation

Elevations

Exterior Elevations: show the front, rear and sides of the house, including exterior materials, details and measurements.

Mechanical

Required Views

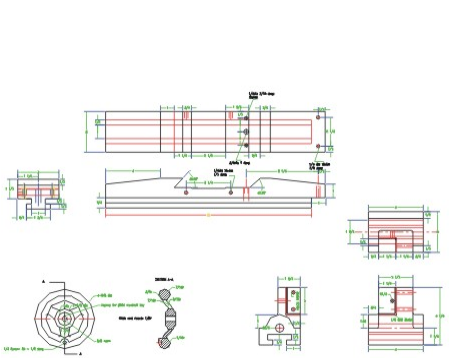
Required Views: show details and specifications for every view that is necessary for the production of the part (e.g. only views that contain useful information). These views usually consist of the front, top, & right side.

Section Views

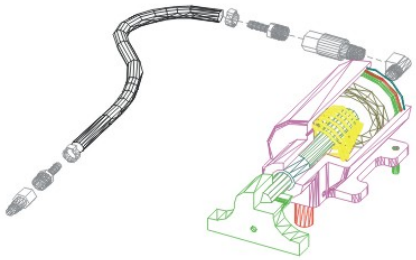
Section Views: show the part as if it were cut in pieces. These views show hidden features that would not ordinarily be visible by the required views. These include full & half section views.

Assembly Views

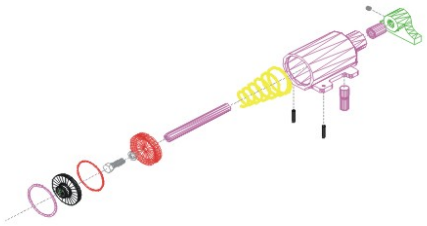
Assembly Drawings: show the placement of parts as if the part was being manufactured.



Required Views



Section Views



Assembly Views

Three Dimensional

3D: shows the desired part in a perspective so that all of the important features are visible. With this view the part has the capability to have special features added, like a background or colors.

Task VI – Research (Costs**)**

Objective: Determine the overall cost of the project. Labor, materials, tools, permits (if necessary), etc.

Skills: Research (Library References and Internet)

Procedure: To be determined by the group of students.

Remember: This project is to be proposed to a group of "investors". The group promises to pay every expense, so charging to much may get your proposal denied; and, charging to little may not allow enough resources to complete the project. For this reason, it is important to be precise when calculating the total cost.

Additionally: Be certain to include the research and scheduling times when calculating labor. (e.g. $20/hour * 15 hours = $300 labor) This is a business and the cost of labor is how everyone gets paid; so, charge a rate that is fair for everyone. (refer back to research).

Task VII – Proposal

Objective: Students will be asked to present their proposals to a team of "investors" (teacher and classmates).

Proposals should include (but are not limited to):

- Power Point slides
- Scale Drawings (various angles and sections)
- Scale Model (if applicable)
- Schedule

Skills: Persuasive Writing, Presentation, Power Point, Excel, Computer

Procedure:

1. Select groups to present their proposals to the class.
2. Have the class determine if it is feasible to construct the project, and peer grade the presenters based on certain criteria

Guiding Questions

A. What is the project? (Detail – PowerPoint, Sketches, etc.)

B. Why should the investors invest in the project?

C. How much does it cost to produce?

D. For how much can the group sell the product?

E. How long does it take to produce? (May need a different schedule for production)

PROJECT RUBRIC

Score Criteria

4 All parts of the report are completed.
The completed model is neat and accurate.
The background information about the project is complete and accurate.
Bibliography accurately lists at least one source.
Three illustrated figures with geometric or mathematical nature are included (at or above grade level requirements) and geometric tools are used to draw diagrams.
Geometric or mathematical nature is accurate.
Spelling and grammar are correct.

3 Substantially accomplishes the purpose of the task.
All parts of the report are completed, but missing title page.
The model is included and built accurately.
Background information about the project is included.
Bibliography accurately lists at least one source.
At least two illustrated folds with geometric or mathematical nature are included (at or above Grade level requirements).
Spelling and grammar are mostly correct.

2 Partially accomplishes the purpose of the task.
Some parts of the report are missing.
The model is included.
Bibliography accurately lists at least two types of sources.
At least one illustrated fold with geometric or mathematical nature is included.
There are some spelling and grammar errors.

1 Makes little or no progress toward accomplishing the task.
The satellite is included.
Background information about the project is attempted.
An attempt at illustrations and the geometric or mathematical nature is made.
Distracting spelling and grammar errors

Evaluation and Assessment

Students will be assessed on: the completion of tasks, on time, as specified by their schedule; the detail and quality of the research; the impact of proposal; and, the overall creativity of the project.

Weekly progress checks will be performed to assure the students are participating and charting all progress on their schedule; also, to examine if the schedule has been revised periodically.

Extension

As a group select the project that would be the most interesting to create and actually create the project. Obviously, some projects will be impossible to make; but, nearly all projects can be scaled down to fit class budget, time, and building area.

Be more specific in the projects allowed for design. (e.g. The project can only cost - $100)

Standards for the Teaching Profession

Creating a Productive Learning Environment

I. Knowledge of Students: Accomplished career and technical educators are dedicated to advancing the learning and well-being of all students. They personalize their instruction and apply knowledge of human development to best understand and meet their students' needs.

II. Knowledge of Subject Matter: Accomplished career and technical educators command a core body of knowledge about the world of work in general and the skills and processes that cut across industries, industry specific knowledge, and a base of general academic knowledge. They draw on this knowledge to establish curricular goals, design instruction, facilitate student learning, and assess student progress.

III. Learning Environment: Accomplished career and technical educators efficiently manage their classrooms and create an environment that fosters democratic values, risk taking, and a love of learning. In this environment, students develop knowledge, skills, and confidence through contextualized learning activities, independent and collaborative laboratory work, and simulated workplace experiences.

IV. Diversity: Accomplished career and technical educators create an environment where equal treatment, fairness, and respect for diversity are modeled, taught, and practiced by all. They take steps to ensure quality career and technical learning opportunities for all students.

Advancing Student Learning

V. Advancing Knowledge of Career and Technical Subject Matter: Accomplished career and technical educators foster experiential, conceptual, and performance-based student learning of vocational subject matter and create important, engaging activities for students that draw upon an extensive repertoire of methods, strategies, and resources. Their practice is also marked by their ability to integrate vocational and academic disciplines productively.

VI. Assessment: Accomplished career and technical educators utilize a variety of assessment methods to obtain useful information about student learning and development, to assist students in reflecting on their own progress, and to refine their teaching.

Helping Students Transition to Work and Adult Roles

VII. Workplace Readiness: Accomplished career and technical educators develop student career decision-making and employability skills by creating opportunities for students to gain understanding of workplace cultures and expectations.

VIII. Managing and Balancing Multiple Life Roles: Accomplished career and technical educators develop in students an understanding of the competing demands and responsibilities that are part of the world of work and guide students as they begin to balance those roles in their own lives.

IX. Social Development: Accomplished career and technical educators develop in students self-awareness, confidence, character, leadership, and sound personal, social, and civic values and ethics.

Improving Education through Professional Development and Outreach

X. Reflective Practice: Accomplished career and technical educators regularly analyze, evaluate, and strengthen the effectiveness and quality of their practice through lifelong learning.

XI. Collaborative Partnerships: Accomplished career and technical educators work with colleagues, the community, business and industry, and postsecondary institutions to extend and enrich the learning opportunities available to students and to ease school-to-work transitions.

XII. Contributions to the Education Profession: Accomplished career and technical educators work with colleagues and the larger educational community both to improve schools and to advance knowledge and practice in their field.

XIII. Family and Community Partnerships: Accomplished career and technical educators work with families and communities to achieve common goals for the education of all students

Student Standards

Mathematics Content Standards

Algebra and Functions

1.0 Students express quantitative relationships by using algebraic terminology, expressions, equations, inequalities, and graphs:
1.1 Use variables and appropriate operations to write an expression, an equation, an inequality, or a system of equations or inequalities that represents a verbal description (e.g., three less than a number, half as large as area A).
1.2 Use the correct order of operations to evaluate algebraic expressions such as $3(2x + 5)^2$.
1.3 Simplify numerical expressions by applying properties of rational numbers (e.g., identity, inverse, distributive, associative, commutative) and justify the process used.
1.4 Use algebraic terminology (e.g., variable, equation, term, coefficient, inequality, expression, constant) correctly.
1.5 Represent quantitative relationships graphically and interpret the meaning of a specific part of a graph in the situation represented by the graph.

3.0 Students graph and interpret linear and some nonlinear functions:
3.1 Graph functions of the form $y = nx^2$ and $y = nx^3$ and use in solving problems.
3.3 Graph linear functions, noting that the vertical change (change in *y*- value) per unit of horizontal change (change in *x*- value) is always the same and know that the ratio ("rise over run") is called the slope of a graph.
3.4 Plot the values of quantities whose ratios are always the same (e.g., cost to the number of an item, feet to inches, circumference to diameter of a circle). Fit a line to the plot and understand that the slope of the line equals the quantities.

Measurement and Geometry

1.0 Students choose appropriate units of measure and use ratios to convert within and between measurement systems to solve problems:
1.1 Compare weights, capacities, geometric measures, times, and temperatures within and between measurement systems (e.g., miles per hour and feet per second, cubic inches to cubic centimeters).
1.2 Construct and read drawings and models made to scale.
1.3 Use measures expressed as rates (e.g., speed, density) and measures expressed as products (e.g., person-days) to solve problems; check the units of the solutions; and use dimensional analysis to check the reasonableness of the answer.

Mathematical Reasoning

1.0 Students make decisions about how to approach problems:
1.1 Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.
1.2 Formulate and justify mathematical conjectures based on a general description of the mathematical question or problem posed.
1.3 Determine when and how to break a problem into simpler parts.

2.0 Students use strategies, skills, and concepts in finding solutions:
2.1 Use estimation to verify the reasonableness of calculated results.
2.2 Apply strategies and results from simpler problems to more complex problems.
2.3 Estimate unknown quantities graphically and solve for them by using logical reasoning and arithmetic and algebraic techniques.
2.4 Make and test conjectures by using both inductive and deductive reasoning.
2.5 Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.

2.6 Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.
2.7 Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.
2.8 Make precise calculations and check the validity of the results from the context of the problem.

3.0 Students determine a solution is complete and move beyond a particular problem by generalizing to other situations:
3.1 Evaluate the reasonableness of the solution in the context of the original situation.
3.2 Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.
3.3 Develop generalizations of the results obtained and the strategies used and apply them to new problem situations.

Science Content Standards

Investigation and Experimentation

9. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
a. Plan and conduct a scientific investigation to test a hypothesis.

b. Evaluate the accuracy and reproducibility of data.

c. Distinguish between variable and controlled parameters in a test.

d. Recognize the slope of the linear graph as the constant in the relationship $y = kx$ and apply this principle in interpreting graphs constructed from data.

e. Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.
f. Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time, density = mass/volume, force = pressure x area, volume = area x height).
g. Distinguish between linear and nonlinear relationships on a graph of data.

Other Standards

Contingent on particular project chosen by the student.