

Project Planning Template Straw House with Solar

COURSE: Architecture and Construction	DURATION: 4 weeks	TEACHER:	
GLOBAL ISSUE OVERVIEW			
<p>Green is more than a color... Global warming is a trending topic that elicits strong responses. Regardless of one's opinion, the need for reliable energy is undeniable; an increasing world population leads to increasing demand for energy. For many, energy for business use and for personal use is dangerous, unreliable, or financially inaccessible. Additionally, fossil fuels, a common source of energy, are finite, degrade the environment, and the location of key reserves of fuel in politically unstable areas of the world makes reliance on them susceptible to erratic supplies and extreme fluctuations in price. Clean energy in the form of solar or wind represents possible solutions.</p> <p>The world is relying on "green" and sustainable building materials and increased interest in free, sustainable energy from solar panels to generate and store electrical power. Constructing homes and public structures from sustainable building products and the use of unlimited power from the sun is economically feasible and a sound public policy.</p>			
STANDARDS ADDRESSED			
Career/Technical Knowledge and Skills	Academic Knowledge and Skills	21st Century Skills	
<ol style="list-style-type: none"> Determine and apply appropriate scale. Recognize cross-referencing on technical drawings. Draft a floor plan from preliminary sketch. Apply dimensions with annotations. Develop a finished floor plan of a residential 	<p>Math:</p> <p>Number & Quantity: Quantities N-Q.1; N-Q.2; N-Q.3</p> <p>Geometry: Geometric Measurement and Dimension G-GMD.3; G-GMD.4</p>	<p>Learning and Innovation Skills:</p> <ul style="list-style-type: none"> Critical Thinking and Problem Solving Communication and Collaboration 	

single family structure utilizing straw bales for exterior wall construction and solar panels for electrical requirements.	Geometry: Modeling with Geometry G-MG.1; G-MG.3	Life and Career Skills: <ul style="list-style-type: none"> • Flexibility and Adaptability • Initiative and Self-Direction • Productivity and Accountability • Leadership and Responsibility
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PROJECT DEFINITION & GOALS/OBJECTIVES

Lesson Objectives

- Define (in Writing) aligned dimensioning and know proper dimension numeral placement. (Applied Math)
- Identify the standard dimension-line placement and spacing for floor plans. (Applied Math)
- State (in Writing) the standard height of dimension numerals (1/8”), and know both conventional English and metric unit application. (Applied Math)
- Describe the standard method for dimensioning an exterior and interior wood framed wall. (Applied Math)
- Cite (in Writing) dimensioning procedures for standard interior features, including refrigerators, cabinets, doors, and shower stalls. (Applied Math)
- Access and implement dimensional data of common sizes of architectural features. (Applied Math)
- Dimension masonry veneer, concrete block, and solid concrete construction. (Applied Math)
- Distinguish (in Writing) specific (local) notes and general notes and place them properly in the drawing.
- Contrast specifications from drawing notes.
- Distinguish (in Writing) between hard and soft conversion of metric units, and accurately calculate hard conversions from English to metric units of measure. (Applied Math)
- Express metric units on a drawing, using standard rules for writing metric symbols and names. (Applied Math)
- Specify common metric scales used in architectural drafting. (Applied Math)
- Demonstrate the “point-to-point” CADD dimensioning method. (Applied Math)
- Cite (in Writing) various types of dimension-line terminators. (Applied Math)
- Describe (in Writing) the typical procedures for drawing CADD leader lines for specific notes.

SCENARIO OR PROBLEM: What scenario or problem will you use to engage students in this project?

Problem Statement:

Mr. and Mrs. Johnson have been transferred to a posting in Japan, and have requested that working drawings for a single family residence be completed in “x” class days (or to be determined by the instructor). The Johnsons are extremely concerned with sustainable materials and solar applications to make their new house as energy efficient as possible. They have done extensive research regarding straw bale construction for all exterior walls and have requested that your design utilize this building material. Straw construction materials have been used on the African plains, as well as in Asia, for centuries. The Johnsons have also requested that you design this new house with a flat roof to accommodate solar panels.

As this new house will be constructed in Japan, you will need to convert all imperial dimensions into metric dimensions.

Floor Plan: (Make sure to research availability in Japan of ALL materials you use in the drawing.)

1. 1800 sq ft+- single family residence (+-5% of 1800 sq ft) with garage (500 sq ft)
2. Flat roof for solar panel installation per manufacturer
3. Straw bales for all exterior walls
4. 2x4 interior walls
5. 2x8 plumbing (wet) walls
6. Laundry closet
7. Two bedrooms will require a closet, at least 2' deep and 6' wide.
8. Master bedroom with full bath and 2'x9' closet
9. Living room
10. Kitchen / dining area separated by a 4' pony wall
11. Formal dining room
12. Title and scale the drawing at $\frac{1}{4}'' = 1'-0''$, North arrow.
13. Dimension all interior walls to center of studs (on the exterior “strings” of dimensions).
14. Dimension all exterior windows and doors to their centers.
15. Opening (door and window) schedule required. Each window and door will have a unique identifier.
16. Electrical information is NOT required.
17. EXPECT changes to the floor plan during the design phase.
18. Order of dimensions: interior walls, doors/windows, major offsets, overall
19. Plus...a presentation drawing with all walls shown solid; add furniture, fixtures, etc., for client's review.

Foundation Plan:

1. Dimension as appropriate. Title and scale the drawing at 1/4" = 1'-0", North arrow.

Exterior Elevations:

1. Four exterior elevations are required.
2. Provide all material call-outs, finished grade, roof pitch symbol, and dimension as required.
3. Title and scale the drawing at 1/4" = 1'-0".

Building Section: Two (2) full building sections are required. Call-out (label) and dimension the drawing as per generally accepted architectural practices.

Site Plan: Per site description TBD utilizing the polar coordinate method at a scale of 1" = 20'

Submittal Drawing Requirements:

Combine all drawings onto one or two "bordered" "D" size side border architectural sheet(s) for plotting.

Assessment: ADDA and AIA Industry Standards and International Residential Codes (IRC) are to be followed.

Essential Questions	Grade Level Adaptations
<ul style="list-style-type: none">• What's the impact of sustainable material usage on construction design?• What's the impact of alternative energy sources on building design?	Students in lower grades could work in teams, led by the teacher to introduce certain aspects of building design.

ASSESSMENT: How will you determine what students have learned? (Check all that apply)

FORMATIVE		SUMMATIVE	
Quizzes/Tests	X	Multiple Choice/Short Answer Test	X
Notes/Graphic Representations	X	Essay Test	
Rough Draft	X	Written Product with Rubric	
Practice Presentation	X	Oral Presentation with Rubric	
Preliminary Plans/Goals/Checklists of Progress	X	Other Product or Performance with Rubric	
Journal/Learning Log		Self-Evaluation or Reflection	X
Other:	X	Evaluation by Authentic Audience	
		Other: 3D model	

MATERIALS, RESOURCES, or CONSTRAINTS: What materials and resources will be needed? Are there any perceived challenges?

- CAD hardware and software (i.e., Softplan 2016 EDU or Pro Versions)
- *Architecture: Residential Drafting and Design*, 12th Edition, Goodheart-Willcox Publisher, Inc.
- Student-Project-Plan-Reviewing – Individual Reflection Questions from **Project Management Toolkit for Teachers** found at <http://pmief.org/learning-resources/learning-resources-library/project-management-toolkit-for-teachers?tab=Toolkit%20Materials>

SUPPORT, MODIFICATIONS, AND EXTENSIONS: What is needed to provide support for students who have difficulty learning the content, modify for students with special learning needs, or to provide enrichment for advanced students?

Size and scope of project can be modified to accommodate special needs considerations.

CALENDAR OF MAJOR LEARNING ACTIVITIES—What are the learning activities or tasks for each day? Are there any project milestones? When will formal assessment activities occur?

Week 1				
Monday	Tuesday	Wednesday	Thursday	Friday
Research building materials and	Research building materials and sustainable	Begin design schematics for design of Floor Plan.	Continue design schematics for design of Floor Plan.	Begin drafting Floor Plan with CAD software.

sustainable design considerations for overall project.	design considerations for overall project.			
Week 2				
Continue drafting Floor Plan.	Continue drafting Floor Plan.	Finish drafting Floor Plan. Floor Plan submitted today.	Begin drafting Foundation Plan.	Finish drafting Foundation Plan. Submit completed Foundation Plan today.
Week 3				
Begin drafting Exterior Elevations.	Complete Exterior Elevations and submit completed drawings of elevations today.	Begin Building Section drawings.	Complete Building Section drawings and submit completed drawings today.	Begin Site Plan drawing.
Week 4				
Complete Site Plan drawing and submit completed drawing today.	Formal Assessment of completed project begins today with verbal presentation.	Formal Assessment of completed project continues with verbal presentation.	Formal Assessment of completed project continues with verbal presentation.	Formal Assessment of completed project continues with verbal presentation. Self-reflection – using PMI Individual Reflection questions.
STUDENT REFLECTION ACTIVITIES —How will students reflect on their work? Add reflection questions and/or activities here.				
<p>Student self-reflection:</p> <p>Student-Project-Plan-Reviewing – Individual Reflection Questions from Project Management Toolkit for Teachers found at http://pmief.org/learning-resources/learning-resources-library/project-management-toolkit-for-teachers?tab=Toolkit%20Materials</p>				

Adapted from: Southern Regional Education Board, Unit Planning Template, 592 10th St. N.W., Atlanta, GA 30318-5776