Strengthened Senior High School

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Learning Activity Sheets for Photovoltaic Systems Installation

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Learning Activity Sheet for Photovoltaic Systems Installation
Grade 12

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LEARNING ACTIVITY SHEET (LAS)

Learning Area:	PHOTOVOLTAIC SYSTEMS INSTALLATION	**Term:**	1
Lesson Exemplar:	1	**Date:**	
Lesson Title/ Topic:	**Site Assessment Procedures for PV Installation**		
Name:		**Grade & Section:**	

I. ACTIVITY NO. 1: The Solar Site Assessor: Four Criteria Challenge

II. OBJECTIVES:
After completing this learning activity sheet, you will be able to:

1. Calculate shading losses, verify orientation (azimuth and tilt), and test structural load capacity as critical criteria for PV site selection.
2. Use basic assessment tools and visual inspection techniques to evaluate a site's suitability for solar panel installation.
3. Present accurate site assessment findings with objectivity, attention to detail, and proper justification.

III. MATERIALS NEEDED:
- Printed copy of this Activity Sheet
- Pen or pencil
- Optional but helpful: Smartphone with Compass app and Clinometer app (e.g., "Angle Finder" or "Bubble Level")

IV. INSTRUCTIONS
Read each section carefully. You will analyze three real-world scenarios, then answer a short quiz. Write your answers in the spaces provided. Work independently or in pairs as your teacher directs.

Scenario 1: The Suburban Home
Description: A new house with a south-facing asphalt shingle roof. There's one large oak tree on the south side of the property, but it is 30 feet away. The roof peak clears the tree's shadow after 10:00 AM. The roof looks structurally sound.



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Criterion	Go	Caution	No-Go	Your Justification
Solar Resource & Shading				
Structural Integrity				
Orientation & Tilt				
Accessibility & Safety				

Overall, is this site suitable? (Circle one) **YES / NO / YES with conditions**

If conditions, explain: _____

Scenario 2: The Old Commercial Building
Description: A flat, rubber membrane roof on a 40-year-old commercial building. No shading from trees or buildings. However, there is visible ponding water (puddles that don't drain) on the roof. The client has no record of any roof inspection or repair.



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Criterion	Go	Caution	No-Go	Your Justification
Solar Resource & Shading				
Structural Integrity				
Orientation & Tilt				
Accessibility & Safety				

Overall, is this site suitable? (Circle one) **YES / NO / YES with conditions**

If YES with conditions, explain: _____

Scenario 3: The North-Facing Slope
Description: A north-facing roof (in the Northern Hemisphere) in good condition with a steep pitch. The roof is structurally sound, accessible, and has zero shading. The homeowner insists on installing panels here because it's the "only roof they have."



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Criterion	Go	Caution	No-Go	Your Justification
Solar Resource & Shading				
Structural Integrity				
Orientation & Tilt				
Accessibility & Safety				

Overall, is this site suitable? (Circle one) **YES / NO / YES with conditions**

If YES with conditions, explain: _____

Part B: Check Your Knowledge (Quiz)

Instruction: Answer the following questions in 1–2 complete sentences each.

1. What is the "peak solar window" time frame that a site should ideally be free from shading?

_____
_____
_____

2. In the Northern Hemisphere, what is the optimal orientation (direction) for a fixed-tilt PV array to maximize energy production?

_____
_____
_____

3. Why is assessing the age and condition of a roof a critical part of the site assessment process? (Hint: Think about the weight of panels and future repairs.)

_____
_____
_____

4. Name two potential shading obstacles an installer should look for during a site visit.
   a. _____ b. _____

5. **Critical Thinking:** A client has a roof that is perfectly oriented (true south) and completely free of shade. However, a structural inspection reveals severe termite infestation affecting the roof rafters. Would you consider this site suitable for PV installation? Justify your answer in one sentence.

_____
_____
_____
_____

V. Synthesis

Complete the following sentence based on what you learned in this activity:

"Before installing solar panels, a site assessment is essential because it ensures that the location is _____, the structure is _____, and the solar resource is _____ for a long-term, productive, and safe system."

LEARNING ACTIVITY SHEET (LAS)

Learning Area:	PHOTOVOLTAIC SYSTEMS INSTALLATION	**Term:**	2
Lesson Exemplar:	1	**Date:**	
Lesson Title/ Topic:	**Inspection of PV Components: Compliance with IEC, UL, and PEC Standards**		
Name:		**Grade & Section:**	

V. ACTIVITY NO. 1: The Standard Detective

VI. OBJECTIVES:
After completing this learning activity sheet, you will be able to:

1. Identify the key PV components (module, inverter, charge controller) and the major standard-setting bodies (IEC, UL, PEC).
2. Explain the significance of IEC, UL, and PEC standards in ensuring safety, performance, and compliance.
3. Apply an inspection checklist to verify the physical condition and certification labels of PV components.
4. Analyze whether a PV component label meets the requirements of the PEC and relevant international standards.

VII. MATERIALS NEEDED:
- Sample product labels of PV components (provided in this LAS or printed by the teacher)
- PV Component Inspection Checklist (provided on page 5)
- Ballpen or pencil
- Highlighter (optional)
- Smartphone or internet access (for enrichment activity only)

VIII. INSTRUCTIONS (Duration: 60 Minutes)
Pedagogy: 4As Approach (Activity, Analysis, Abstraction, Application)

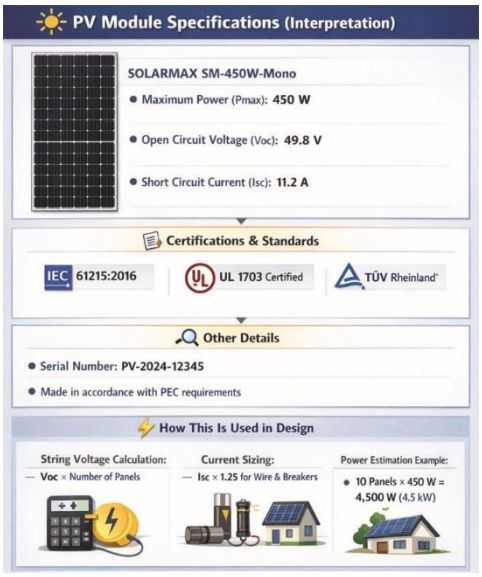
A. Activity: Label Hunting (10 Minutes)
Examine the sample label below from a real PV module. Encircle or list down any logos, acronyms, or symbols that look like official certifications. Write your observations in the space provided below.

My Observations (List all logos/acronyms you found):

1. _____
2. _____
3. _____
4. _____
5. _____

Processing Question: Why do you think manufacturers put these symbols on their products?

_____
_____
_____
_____
_____



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B. Analysis: **Why Standards Matter** (10 Minutes)
Direction: Read the scenario below and answer the reflective questions that follow.

Scenario:
You are a newly hired PV system installer. Your team lead gives you two identical-looking solar panels. Panel A has a UL 1703 and IEC 61215 certification label. Panel B has no certification labels at all—only a generic "Made in X-country" sticker. Both panels are being sold at the same price. Your client asks you: "Which one should I buy, and why does it matter?"

Reflective Questions: (Write your answers in complete sentences)

1. Which panel would you recommend to your client? Why?

   _____
   _____

2. What potential risks might the client face if they choose the uncertified Panel B?

   _____
   _____

3. Based on the scenario, what is the most important reason for inspecting PV components before installation?

   _____
   _____

C. Abstraction: The Three Pillars of PV Standards (15 Minutes)
Directions: Study the information below. Then complete the matching exercise that follows.

The Three Major Standards for PV Components

Standard	Full Name	What It Covers	What to Look For
IEC	International Electrotechnical Commission	International standards for electrical technology. **IEC 61215** tests PV module durability (hail, wind, temperature cycles).	Label stating IEC 61215 or IEC 61730
UL	Underwriters Laboratories	US-based safety testing. **UL 1703** tests PV modules for fire and electrical shock hazards.	UL logo (circled "UL") or UL 1703 on label
PEC	Philippine Electrical Code	The governing electrical law in the Philippines. **Article 6.90** covers PV systems. Requires components to be listed by a recognized testing lab.	Not a sticker—but mandates that UL/IEC marks must be present

The "Glass Box" Analogy for Inspection:

Think of standards as the "glass box" that contains the rules. Just as orthographic projection shows all sides of an object, a proper inspection shows all aspects of compliance:

Plane	**Inspection Equivalent**
Frontal Plane (Front View)	Physical condition of the component (no cracks, corrosion, or damage)
Horizontal Plane (Top View)	Label presence and legibility
Profile Plane (Side View)	Certification marks (IEC, UL, PEC compliance)

Matching Exercise: Match the standard (Column A) to its correct description (Column B).
Write the letter of your answer in the blank.

Answer	**Column A**	**Column B**
	1. IEC 61215	A. The electrical code enforced in the Philippines
	2. UL 1703	B. Tests PV modules for durability against hail and wind
	3. PEC Article 6.90	C. The logo that indicates third-party safety certification
	4. UL logo (circled)	D. Tests PV modules for fire and electrical shock hazards

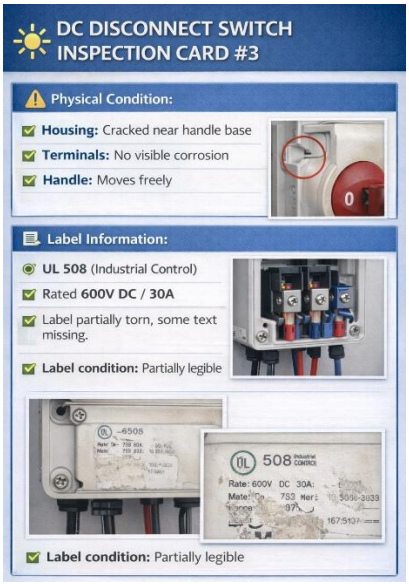
	5. PEC	E. The specific section covering Solar PV Systems

D. Application: PV Component Inspection Simulation (25 Minutes)

Task: You are a PV system installer conducting a pre-installation inspection. You will analyze three component cards below. For each card, complete the Inspection Checklist and determine whether the component PASSES or FAILS the inspection.







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PV COMPONENT INSPECTION CHECKLIST

Inspection Item	PV Module	Inverter	DC Switch
Physical Condition			
No cracks or damage?	☐	☐	☐
No corrosion?	☐	☐	☐
Enclosure/cover secure?	☐	☐	☐
Label & Documentation			
UL mark present?	☐	☐	☐
IEC mark present?	☐	☐	☐
PEC compliance indicated?	☐	☐	☐
FINAL DISPOSITION	☐PASS ☐ FAIL	☐PASS ☐ FAIL	☐PASS ☐ FAIL

Decision Questions: (Answer after completing the checklist)

1. For **Card 1 (PV Module)**: What is the main issue that might cause this module to FAIL, if any? Explain.
   _____
   _____
   _____

2. For **Card 2 (Inverter)**: Why is the "CE" mark alone not sufficient for PEC compliance?
   _____
   _____
   _____

3. For **Card 3 (DC Switch)**: What two problems make this component non-compliant?
   _____
   _____
   _____

IX. SYNTHESIS / EXTENDED PRACTICE / DIFFERENTIATION

A. Synthesis (Exit Slip): *Answer the following questions on a separate sheet of paper.*

1. Why is it important that a PV component label is "permanently affixed" and not just a removable sticker?
2. What is the relationship between the PEC and certification marks like UL and IEC? (Which one is the law, and which one provides the evidence of compliance?)
3. Aside from checking labels, why is a physical inspection (looking for cracks, corrosion, loose parts) equally important?

B. Extended Practice (Enrichment):

Using your smartphone or computer, search for an actual product label from a real PV module or inverter (you can look up brands like SolarMax, Growatt, Huawei, or SMA). Take a screenshot or draw the label and identify the following:

- UL mark (circled "UL") or UL standard number
- IEC standard number (e.g., IEC 61215, IEC 61730)
- Recognized testing laboratory name (e.g., TÜV, CSA, Intertek)
- Serial number or model number

Submit your findings to your teacher on the next meeting.

C. Remediation (For students who need more practice):
Create a simple **3-column table** comparing IEC, UL, and PEC. Include:

Standard	Purpose	What to look for during inspection
IEC		
UL		
PEC		

Submit the completed table to your teacher.