



## TOPIC OF STUDY

OSHA Safety Requirements

 90 MINUTES

## KEY TERMS

personal fall arrest system  
roof anchor  
harness, lifeline  
hitch clip  
hard hat  
gloves  
eye protection

## LESSON

Roof Safety and Personal Fall Arrest Systems

## OVERVIEW

Safety is the top priority when working on construction sites. Students will learn the safety requirements for working. These lessons will be woven into all times when working on the roof.

## OBJECTIVES

Students will:

- Identify types of ladders and when to use each type (when to use metal v. fiberglass)
- Inspect ladders for damage and label damaged ladders
- Demonstrate proper ladder safety techniques including, footing, rise over run, securing, height above roof line, and various support systems
- Demonstrate the use of personal fall arrest systems by correctly wearing and adjusting equipment

## TASK LIST SUBCATEGORY

- 302 Demonstrate use of Personal Fall Arrest Systems (PFAS)
- 303 Demonstrate the use of PPE
- 304 Identify the causes of jobsite accidents

## STANDARDS

### PA/SDP

**3.4.10.A2.** Interpret how **systems** thinking applies logic and creativity in complex real-life problems.

**3.4.12.B1.** Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of **technologies**.

**3.4.12.C3.** Apply the concept that many technological problems require a multi-disciplinary approach.

**13.3.1.A.** (Career and Work) Evaluate personal attitudes and work habits that support career retention and advancement.

## INSTRUCTIONAL

### TEXT/REFERENCES

Solar Photovoltaic Basics, White. Chapter 2, pp. 13-22

### MATERIALS NEEDED

**Teacher Presentation:** PPE and Fall Protection Equipment (see #1 in Implementation list)

**Content:** OSHA web site

**Technology:** web browser to view videos



## IMPLEMENTATION (LESSON PLAN)

1. The first day of class layout fall arrest PPE and ask students to guess what each object is and how it works. Lay out the following items
  - *Harness*
  - *Lanyard*
  - *Lifeline*
  - *Roof anchor or hitchclip*
  - *Hard Hat*
  - *Gloves*
  - *Eye Protection (when drilling or cutting metal)*
2. Teacher demonstrates how to properly wear and adjust fall arrest systems. Allow all students to try on and adjust fall arrest PPE and set a rule that all students on the roof must be wearing PPE (Just like real life on a roof). (watch Home Depot video linked below if necessary). Teacher designates the flat roof and/or mock roof area as a location where all students must be wearing PFAS . Teacher should designate one student to serve as safety supervisor: this student monitors all classmates for proper use of equipment. The teacher should also assign pairs of students in a “buddy system” where each student always checks the proper use of the equipment by their partner.
3. Have students create a list of safety rules for working on or around roofs. Establish that OSHA regulations call for fall arrest to be worn whenever a person is in an unguarded area above 6 feet high. Be sure to include “don’t walk backwards” and call out tripping hazards. The length of the lifeline cannot be greater than the distance to the ground. The lifeline should be adjusted to be as short as possible to perform the work while also maintaining the shortest possible fall off of the roof.
4. Discuss limitations of fall arrest systems (you can still fall and swing hard into a building, they are meant to save your life not necessarily prevent all injuries). Discuss why the lifeline must be attached to the back D ring on the harness (to absorb all shock properly). Discuss shock absorption system on lanyard.
5. Demonstrate proper installation of a roof anchor/hitch clip into a structural member of the roof. Discuss the use of screws or double headed nails. Discuss location of anchor/s on the roof and that many lifelines only extend 25’ and thus you may need more than one. Also, no more than 2 people can be hooked into a single anchor (depending on rating). So a second anchor may be needed depending on the number of people on the roof. Have students install anchors.
6. Discuss tripping hazards created by lifelines and retractable lifelines (their benefits and drawbacks).
7. Demonstrate the proper use of hard hats, gloves, and eye protection. Discuss why all of these items are needed. Hard hats must be worn at all times, even on the roof. For example, when solar panels are being carried on the roof it is possible to hit a co-worker in the head with the panel.
8. Never put tools down on the roof. Wear a tool belt and have tools on lanyards to prevent tools from rolling off of the roof. Bring a tool bucket to the roof and harness it to a chimney to secure tools.
9. Ladder safety: The magic ratio is 4:1. For every 4 feet of rise there must be 1 foot of run. Basically when standing at the base of a ladder you should have your feet touching the ladder feet and if you can fully extend your arms and touch the sides of the ladder then it is set up properly. Ladders should extend 3 feet above the roof line. Fiberglass ladders are the only ladder type acceptable for electrical work. Metal ladders conduct electricity and can ground the person working on them making them susceptible to electrical shock.





## RESOURCES/LINKS

Home Depot Fall Protection

<https://www.homedepot.com/p/Guardian-Fall-Protection-Rooftop-Safe-Tie-Bucket-Kit-00815-QC/202898758>

Industrial Safety Products

[https://www.industrialsafetyproducts.com/dbi-sala-retractable-horizontal-60-cable-lifeline-system-7605060/?gclid=Cj0KCQjwsZKJBhC0ARIsAJ96n3VCBKr5r-AQiT5SHHuN6KpyRQa8GFOzNmODx-UqM7\\_OnxctMDPA8qAaAjZaEALw\\_wcB](https://www.industrialsafetyproducts.com/dbi-sala-retractable-horizontal-60-cable-lifeline-system-7605060/?gclid=Cj0KCQjwsZKJBhC0ARIsAJ96n3VCBKr5r-AQiT5SHHuN6KpyRQa8GFOzNmODx-UqM7_OnxctMDPA8qAaAjZaEALw_wcB)

OSHA Ladder Safety

<https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.1053>



SOLAR

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