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L1 Quiz Key: Ladder and Lift Safety

- 1)** Portable ladders used for access to an upper landing surface, such as a house roof, shall have side rails that extend at least _____ above the upper landing surface to which the ladder is used to gain access.
- a) 2 rungs
 - b) 3 feet (0.9 m)
 - c) 1.6 feet (0.5 m)
 - d) 6 feet (1.8 m)

b.) 3 feet (0.9 m)

Explanation

Per OSHA 1926.1053(b)(1), the ladder side rails must extend at least 3 feet above the upper landing surface to which the ladder is used to gain access. The purpose of the 3 foot minimum is to support the worker getting on and off the ladder. There is no maximum distance.

- 2)** Choose the best ladder from the list below for working on an exterior conduit run adjacent to utility power lines:
- a) Aluminum extension ladder
 - b) Telescoping ladder
 - c) Fiberglass extension ladder
 - d) Orchard ladder

c.) Fiberglass extension ladder

Explanation

Per OSHA 1926.1053(b)(12), ladders shall have nonconductive siderails if they are used where the employee or ladder could contact exposed energized electrical equipment. For voltages up to 50kV, the minimum clearance distance is 10 feet. When work must be done adjacent to utility power lines, request that the utility disconnect or place an insulated wrap over the conductors.

- 3)** Match the following ladder Duty Rating with the proper ANSI Code:
- | | |
|------------------------|-------------|
| a) 200 pounds / 91 kg | 1. Type I |
| b) 225 pounds / 102 kg | 2. Type IA |
| c) 250 pounds / 113 kg | 3. Type IAA |
| d) 300 pounds / 136 kg | 4. Type II |
| e) 375 pounds / 170 kg | 5. Type III |

- a) 5***
- b) 4***
- c) 1***
- d) 2***

e) 3

Explanation

There are five categories of ladder duty ratings:

Type IAA (Extra Heavy Duty)- maximum weight capacity 375 pounds

Type IA (Extra Heavy Duty)- maximum weight capacity 300 pounds

Type I (Heavy Duty)- maximum weight capacity 250 pounds

Type II (Medium Duty)- maximum weight capacity 225 pounds

Type III (Light Duty)- maximum weight capacity 200 pounds

4) When selecting a portable ladder for residential solar construction, choose which items to consider when evaluating a ladder's duty rating. Choose all that apply.

- a) A worker's body weight, including clothing
- b) A worker's protective equipment and tool belt
- c) The weight of tools carried by the worker
- d) The amperage of the solar circuit(s)
- e) The weight of equipment carried by the worker
- f) The voltage of a solar module

A worker's body weight, including clothing, A worker's protective equipment and tool belt, The weight of tools carried by the worker, The weight of equipment carried by the worker

Explanation

When selecting a ladder, consider the sum of the person's weight, the weight of the person's clothing and protective equipment, and the weight of any tools and equipment or materials. It is always safest to overestimate the total load, as multiple workers with varying body weights and equipment may use the ladder during an installation.

5) True or False: An employer is not required to have a training program for each employee using ladders.

False

Explanation

Per OSHA 1926.1060(a), the employer shall provide a training program for each employee using ladders and stairways, as necessary. The program shall enable each employee to recognize hazards related to ladders and stairways, and shall train each employee in the procedures to be followed to minimize these hazards.

6) A PV installer is setting up an extension ladder to access a flat roof with a parapet wall that is 24' tall where the ladder will be placed. What distance from the vertical wall should the ladder's base be positioned?

- a) 3'
- b) 4'
- c) 6'
- d) 8'

c.) 6'

Explanation

Per OSHA 1926.1053(b)(5)(i), non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder.

A simple way to get a feel for the placement ratio is if a person is standing with their toes touching the base of the ladder and they extend their arms out at a 90 degree angle, their fingers should touch the ladder. There are also smartphone apps that can verify the proper ladder angle.

- 7)** True or False: OSHA regulations allow a worker to carry one solar module up a ladder, as long as the building is only one story.

False

Explanation

Per OSHA 1926.1053(b)(21) and (22), each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder. Employee also shall not carry any object or load that could cause the employee to lose balance and fall.

Even on a single story home, it would be impossible to carry the solar module while always maintaining a hand on the ladder. It is best to always maintain 3-points (two hands and a foot, or two feet and a hand) of control on a ladder when climbing. Solar modules are awkwardly large and act like sails in the wind, which presents a fall hazard.

- 8)** Choose three methods from below that could be used to lift solar modules up to a two-story roof.
- a) A strong and qualified person could carry modules up a ladder by themselves
 - b) An aerial boom lift
 - c) A reach forklift
 - d) A ladder-hoist system

An aerial boom lift, A reach forklift, A ladder-hoist system

Explanation

An aerial boom lift, reach forklift, or ladder hoist are all safe and acceptable ways to lift modules to the roof. While equipment rental or purchase costs may appear prohibitive, consider the advantages of safety and labor efficiency. A person should never climb a ladder with a module in hand! This can lead to falls, sprains, strains, or other injuries.

- 9)** Most injuries and fatalities involving scissor lifts are the result of operators not addressing?
(Choose two)

- a) Speed
- b) Stabilization
- c) Positioning
- d) Operating temperature

b.) Stabilization, Positioning

Explanation

Operators must ensure that scissor lifts are stable and won't tip over or collapse. They must also ensure the lift is safely positioned to avoid caught-between injuries or electrocution hazards from overhead power lines.

- 10)** True or False: Workers using crawling boards (chicken ladders) to install solar modules on steep roofs are not required to use any additional fall protection.

False

Explanation

Per OSHA 1926.451(g)(1)(iii), each employee on a crawling board (chicken ladder) shall be protected by a personal fall arrest system, a guardrail system (with minimum 2000 pound toprail capacity), or by a 3/4 inch diameter grabline or equivalent handhold securely fastened beside each crawling board.

- 11)** OSHA Standard 29 CFR _____ is specifically for regulations concerning the construction industry.
- a) 1926
 - b) 1930
 - c) 1690
 - d) 1906

a.) 1926

Explanation

OSHA standards are divided into four major categories based on the type of work being performed: agriculture (29 CFR 1928), construction (29 CFR 1926), general industry (29 CFR 1910) and maritime (29 CFR 1915, 1917, and 1918). Solar installation work generally falls under the construction category.

- 12)** Choose three accessories from below that could be used to help stabilize an extension ladder.
- a) Leg leveler
 - b) A small piece of solar rail
 - c) A tie-off
 - d) Ladder stabilizer
 - e) Two people on the ladder

Leg leveler, A tie-off, Ladder stabilizer

Explanation

Per OSHA 1926.1053(b)(6), ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement. Using tie-offs, leg levels, stabilizers or other appropriate accessories to help stabilize extensions ladders is a great best practice, regardless of the site conditions.

13) True or False: When unloading modules from a ladder-hoist system, the worker on the roof does not need fall protection, since they are not performing any work with the module.

False

Explanation

Per OSHA 1926.501(b)(1), each employee on a walking/working surface with an unprotected side or edge which is 6 feet or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems. Fall protection requirements are covered in detail in lesson 2!

14) When using an aerial boom lift to access a roof or install conduit, operators (choose all that apply):

- a) Must be properly trained
- b) Must watch for hazards, such as overhead power lines
- c) Are not required to use a body harness with lanyard
- d) Must not exceed the unit's load limits

Must be properly trained, Must watch for hazards, such as overhead power lines, Must not exceed the unit's load limits

Explanation

Safe work practices for aerial lifts include ensuring that workers are properly trained in the safe use of the equipment, including hazard awareness and following of manufacturer's instructions. The major causes of injuries and fatalities involving aerial lifts are falls, electrocutions, and collapses or tip-overs.

15) True or false: A job hazard analysis should be completed prior to the start of PV installation work, or whenever site conditions change.

True

Explanation

A job hazard analysis is an essential part of any solar installation. A job hazard analysis identifies hazards before they occur, allowing the installation crew to take steps to eliminate or control these hazards. Remember, a safe job site is an efficient job site!