Welcome to Ladder Safety

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This session is intended to give an overview of OROSHA's Ladder and Stairway Standard 1926.1050

Ladder Safety?

Is it needed?

Changing Tamworth street light lamps in the early 1900s via motor vehicle

Introduction

- Each ladder related accident averaged 10 wks lost time
- Contractors paid a total of $5,037,500.00 in direct and indirect costs associated with these 155 claims
- A total of $1,007,500.00 direct costs for the 155 claims, ($6500 Worker's comp costs per incident)
- In addition a total of $4,030,000.00 was paid for indirect costs for ladder accidents in 1997, (Indirect costs were an average of 4 x direct costs, $26000.00 per incident).
- **Indirect costs come right out of the contractor's *profit margin* for a job.**

Introduction

- Most falls involve portable ladders that move, tilt or shift while the worker is climbing or descending

- Unstable or slippery base surfaces are the primary reasons the ladders fall over

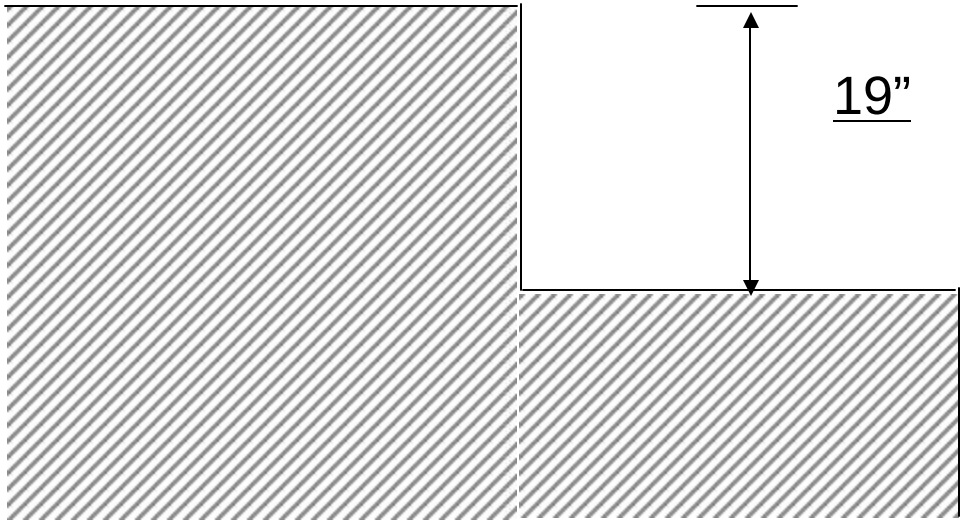
- Other reasons:
  - Misstepping, slip of foot
  - over reaching,
  - overloading,
  - using damaged ladders
  - improper use
  - struck by a vehicle or other object

Introduction

Workers can reduce ladder fall risks by:

- Matching the task to the appropriate ladder.
- Setting ladders correctly
- Climbing and descending ladders properly
- Inspecting and maintaining ladders frequently.

General Requirements



Break in elevation of 19”

- Ladders or a stairway must be provided at all points of access where there is a break in elevation of 19 inches or more.

I Selecting

Ladders come in different types because they are designed to meet the needs of various tasks. Each will have different needs regarding how they are used so matching the ladder to the task and the environment it will be used in is **very** important!

I Selecting

Primary responsibility for ladder selection is with the company when they purchase the ladders to be available for the employees to use.

Consider:

- The heights that will be needed
- The appropriate ladder design for the task
- Adequate weight capacity
- Identify what ladders should be used for what tasks (Job Hazard Analysis/JHA)

Questions to ask when selecting a ladder:

- What type of material will the floor or ground be (supporting surface)?
- Will the supporting surface be wet or dry?
- What will the total weight be that will be on the ladder?
- What length of ladder is needed?
- Will the area workers are accessing have support for the ladder, or will a self supporting ladder be needed?

  - ↖ overhead obstructions?
  - ↖ electrical hazards?
  - ↖ high traffic areas-vehicular or pedestrian?
  - ↖ uneven surfaces? Unstable surfaces?

I Selecting

Exceeding the weight capacity could cause structural damage to the ladder and injury to the ladder user. When selecting the ladder determine the amount of weight that will be applied to it. Remember to add:

The users weight

Weight of any PPE

Weight of tool belt

\+ Weight of material/tools on the ladder

Total weight

I Selecting

All portable ladders receive one of five ratings based on their maximum working load (the maximum weight they can safely support). The ratings are:

Rating	Working Load
Special Duty (Type I-AA)	375 pounds
Extra heavy duty (Type I-A)	300 pounds
Heavy Duty (Type I)	250 pounds
Medium duty (Type II)	225 pounds
Light duty (Type III)	200 pounds

- Do not stand, or step on the top 3 rungs of the ladder*

  ***Note:** This principle must be considered when selecting the length of ladder needed.*

  ***Example:** This means a 20 foot ladder is only good to access a 14 foot landing area as the top three feet must extend above the landing and the three are used to overlap the fly section to the base `*

Note: diagram shown includes three extra feet for climbing onto roof plus allowance for slant of ladder away from house

HEIGHT TO EAVES	EXTENSION LADDER SIZE (total length of sections)	MAXIMUM EXTENDED LENGTH
to 9 ft.	16’	13’
from 9 to 13 feet	20’	17’
from 13 to 17 feet	24’	21’
from 17 to 21 feet	28’	25’
from 21 to 25 feet	32’	29’
from 25 to 28 feet	36’	32’
from 28 to 31 feet	40’	35’

I Selecting

- There are four key elements you should consider in selecting a ladder:

  * Style…. Which king of ladder is right for the job? Step, extension, multi-purpose, etc.
  * Size…. How high do you need to reach? What size ladder to get?
  * Duty Rating…. What is the application? How much weight will be on the ladder?
  * Material…. Where will the ladder be used? Is contact with electrical wires even a remote possibility?

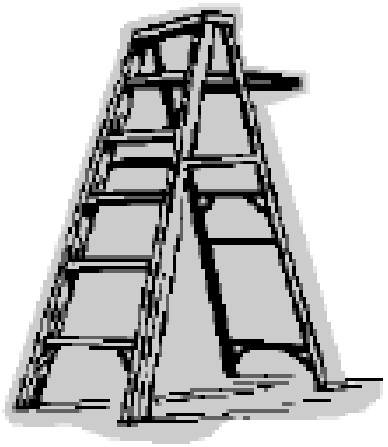
I Selecting

The first step in ladder selection is choosing the right style of ladder for the job. Different styles of ladders are designed to keep you safe and productive when climbing or standing. Using the incorrect style or ladder, or simply ignoring the limitations of climbing equipment, can result in a fall or serious injury.

I Selecting

There are two main categories of portable ladders:

Non-self-supporting



Self-supporting

I Selecting

7 Main types of portable ladders:

- Single or Straight Ladder
- Extension Ladder
- Standard Step Ladder
- Two way Step Ladder
- Platform Ladder
- Trestle Ladder
- Job Made Ladder

I Selecting

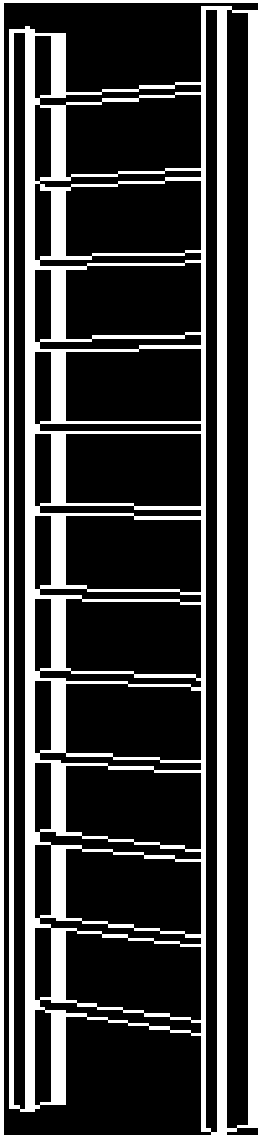
- All ladders must have non slip bases
  - Cord face ladder shoes are recommended for wet surfaces
  - Rubber or neoprene shoes for smooth dry surfaces
  - Steel spikes for icy or snowy footing

I Selecting

Non-self-supporting ladders

Single portable or straight ladder

- General use type ladder is the most common portable ladder with a wide range of applications
- Constructed of metal, wood or reinforced fiberglass
- Must not be longer than 30 feet



Extension ladder

Consists of two or more sections that travel in guides or brackets

Metal and fiberglass ladders

- May have as many as three sections
- Overall length may not exceed 60 feet

Wood ladders:

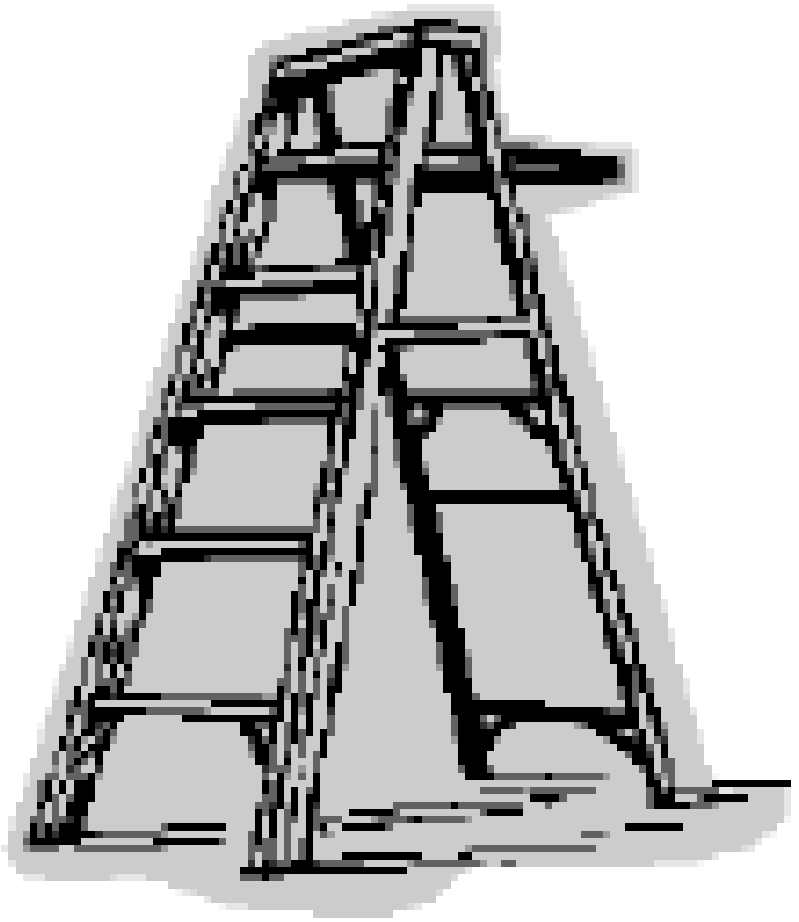
- May have no more than two sections
- Can’t exceed 48 feet in length.

Self-supporting ladders

Standard stepladder

- Should only be used on surfaces that are firm and level such as floors, platforms, and slabs.

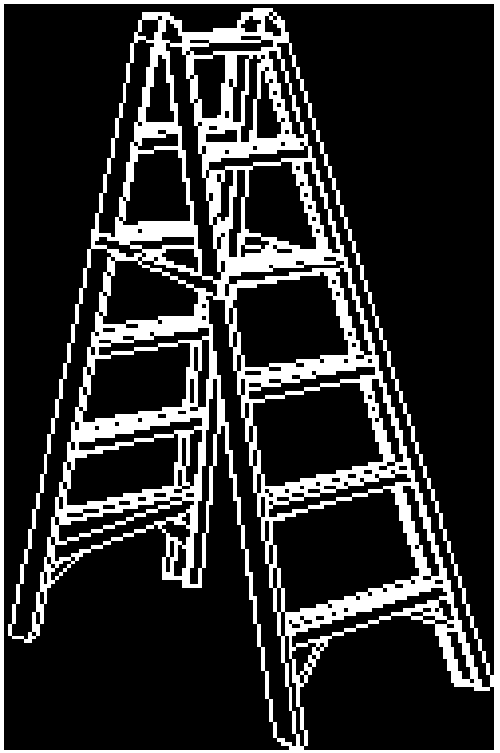
- ***Industrial (type 1A)*** is designed for heavy service demands, has oversize back legs, heavy-duty flat steps, and knee braces that increase rigidity and durability.



I Selecting

Two-way stepladder

- Similar to the industrial standard step ladder; but each side of the ladder has steps and
  - one person can work from either side or two persons can work from the ladder at the same time-- one on each side.
  - is different from a trestle ladder; set apart as it has steps versus the trestle ladder which has rungs



I Selecting

Platform ladder

- Has a large stable platform from which you can work at the highest standing level
- Eliminates the top 2 step use for easier safety & health management

Trestle ladder

- Has two sections hinged at the top, forming equal angles with the base
- Designed to be used in pairs to support planks or staging
- Rungs ***are not*** to be used as steps.
- **Fall protection required after 6 feet when using the trestle ladder.**
- Rails must be beveled at the top and have metal hinges to prevent spreading

I Selecting

Additional rules for: Self supporting ladders

- Can not be longer than 20 feet in length
- Bottom of four rails must have nonslip material
- Must extend 42 inches above the access level or platform if using for access

II Inspection

- Ladders should be inspected before leaving to go to the job site. Don't wait until you get to the job site because the temptation to use a defective ladder is to great when you're already at the site and wanting to get to work.

- Start with the three D's -

  defects, damage, deterioration

  ↓In wood - splinters, splitting, burning

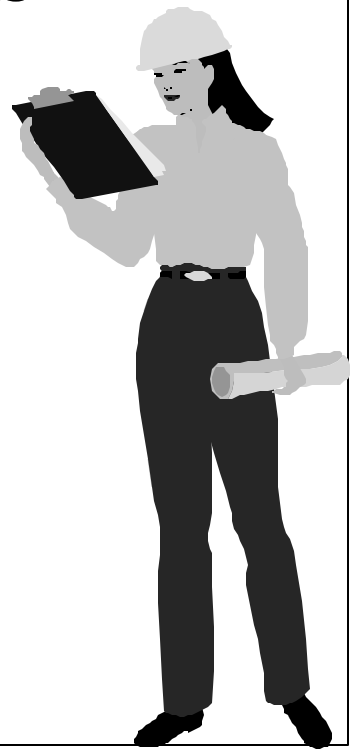
  ↓In metal - corrosion, dents

II Inspection

Ladders must be inspected by:

- A **competent person** for visible defects on a ***periodic*** basis, **and** before further use after any occurrence that could affect their safe use such as a collapse, a tip over, or when exposed to corrosives, oil grease; or welding contact and

- ***Frequently*** by users - daily and prior to use.



II Inspection

RAILS

- Bends, cracks, splitting
- Loose rail connections
- Free from grease, oil
- Sharp points, edges, or splinters
- Warning label/ instructions not covered

II Inspection

RUNGS, CLEATS, AND STEPS

- Missing rungs
- Bends, dents, cracks, splitting, severely worn
- Loose/unsecured side rail connections
- Free from grease, oil, dirt
- Slip-resistant material is intact/adequate (metal)
- No sharp points, edges, splinters, snags

Self Supporting Ladders

- Secure, working, and locking spreader device
- Free from shake when open
- Check all hardware (hinges, rivets, bolts, etc.) to make sure they are still securely in place
- All movable parts operating freely w/out binding/play

Non-Self Supporting Ladders

- Fraying in the rope, operable rope & pulley
  - *Use it! Many smashed fingers!*

- Ensure the rung locks engage properly, not loose

- Non slip safety feet provided and in good condition

- All movable parts operating freely w/out binding/play

II Inspection

- ***What do you do when defective?***

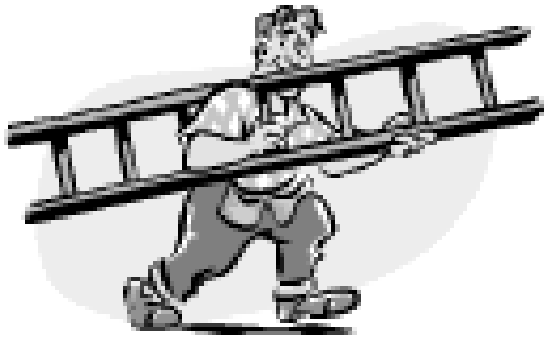
- TAG -- "DO NOT USE"
- Destroy and discard ladder if not repairable
- If repairable, consult vendor/mfg. to ensure it can be repaired to its original capacity.

III Moving The ladder

- **On and off of the vehicle:**
  - Place it parallel to the bed
  - Avoid throwing. or dropping the ladder in the bed
  - Tie the ladder down
  - If side stakes are available use them to prevent lateral movement
  - Drive slowly over rough terrain
  - If the ladder is long and the truck bed is short support the ladder so it won’t sag or bend
  - Get help if storing and transporting on side racks or on top of the truck, or use a mechanical Ladder lifter

III Moving The ladder

- **Moving point to point**
  - ***Never*** move any ladder when you or anyone else is standing on it
  - Move the ladder using two people if possible, if not possible
  - use shoulder pads or other cushioning devices



III Moving the ladder

- Pick up the ladder just forward of the center balance point (the ladder should be at a slightly downward angle towards your back)

- place your arm through the ladder and on the soft muscle at the edge of the shoulder (ladder should be hanging over the shoulder, not all the way on top of it)

- place the opposite hand on the forward section of the ladder to balance and control when moving around corners

- use extra caution when moving around obstructed corners (verbal warning is recommended)

IV Setting up

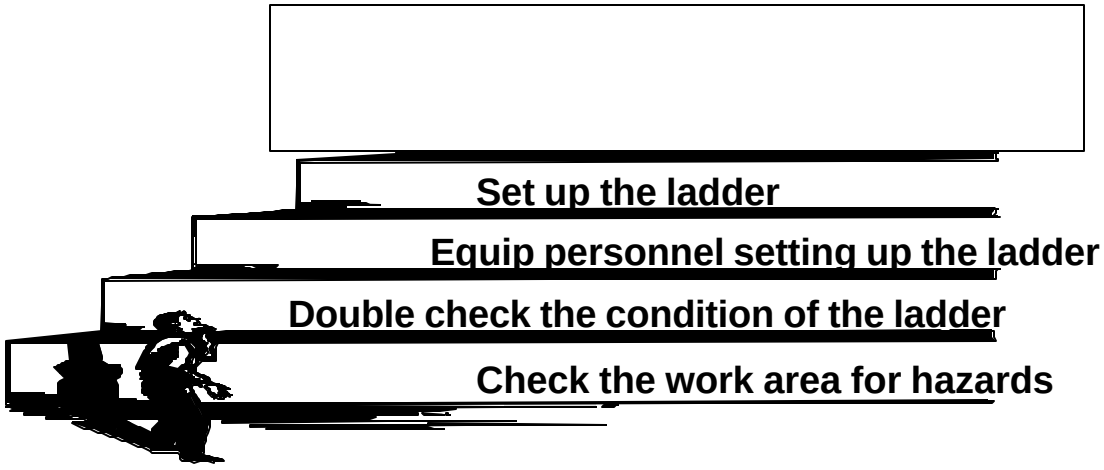
Next to the selection of the ladder, setting up the ladder is the most important step to ladder safety

Over 1/2 of all ladder accidents are caused by falls when the ladder tips over as a result of poor ladder placement.

IV Setting up

There are 4 steps to setting up a ladder:

- Check the work area for potential hazards
- Double check the ladder
- Properly equip personnel involved with the set up; then
- Set up the ladder



IV Setting up

- **Check the work area**

  - To make sure that there is sufficient room to set up the ladder selected based on its needs: such as 4:1 ratio for extension ladders

  - Look up to identify overhead hazards which the ladder could contact such as electrical lines, tree branches or other obstructions

IV Setting up

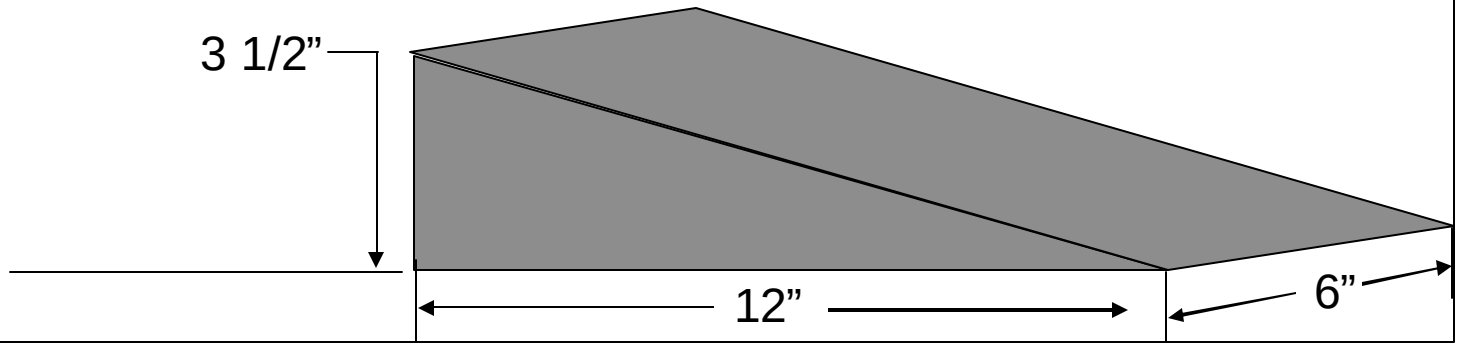
- Prior to setting up the ladder look at the ground the ladder will be resting on:

- Free the area of any potential hazards such as debris, stored material, water or other liquid substances such as loose soil or rock; anything which may effect the stability of the ladder or clear access/egress for the user.

- Check the ground that the ladder will be resting on to assure that it has sufficient strength to support the anticipated working load of the ladder.

IV Setting up

- If the ground is unlevel use leveler devices on the ladder legs or wood wedges of adequate size to support the ladder base and working weight or a device designed to level a ladder. These wedges should be about 12 inches long x 6 inches wide. The slope should be gradual from flat to about a 3 1/2 inch height at the top end.



IV Setting up

- Check for doors opening toward the ladder. Block, lock or guard any doorways found
- Place barricades around the ladder if it's in a high pedestrian or vehicular traffic area.
  Remember: *orange cones offer no actual protection from a moving vehicle. "**Take a second look"** to see if there might be a better spot to locate the ladder **outside** the traffic area**.***
- Place signs in visible locations if the ladder will be working around a blind corner

Courtesy of
Professional Mechanical

IV Setting up

- **Check the ladder:** to see if any oil, mud or other slippery material may have gotten onto the ladder rungs or steps during transport. Clean any material off of the ladder before setting it up

- **Equip personnel** involved in the ladder set up with hard hats to protect against falling objects or potential bumps

Set up the ladder: ***Extension ladder:***

1. Lay the ladder perpendicular to the wall with the bottom of the ladder next to the wall it will lean against and the movable section facing toward you. Raise the ladder by walking it up with your hands rung by rung until it is upright.

2. Slightly pull the base away from the foundation, raise the fly section using the rope & pulley until you have achieved the length desired. **No*te:*** extend ***at least*** **36 in.** above the landing.

3. Pull the ladder base out further until you achieve a 4:1 angle (that's one foot away from the wall for every four feet of vertical height), and are three feet above the area you are accessing.

4. Using your body weight exert downward on the ladder base to test the ground and settle the feet of the ladder. If the ladder sinks you will need to place it on top of a mudsill to distribute the weight and level the feet. ***NOTE:*** a mudsill is a piece of wood approximately 1 1/2 - 2 " thick x 10" wide x 12-18" long; should be longer than the width of the ladder.

IV Setting up

- Ladder displacement is the largest cause of ladder accidents. Securing the ladder is the main way to prevent accidental displacement when the ladder is in use.

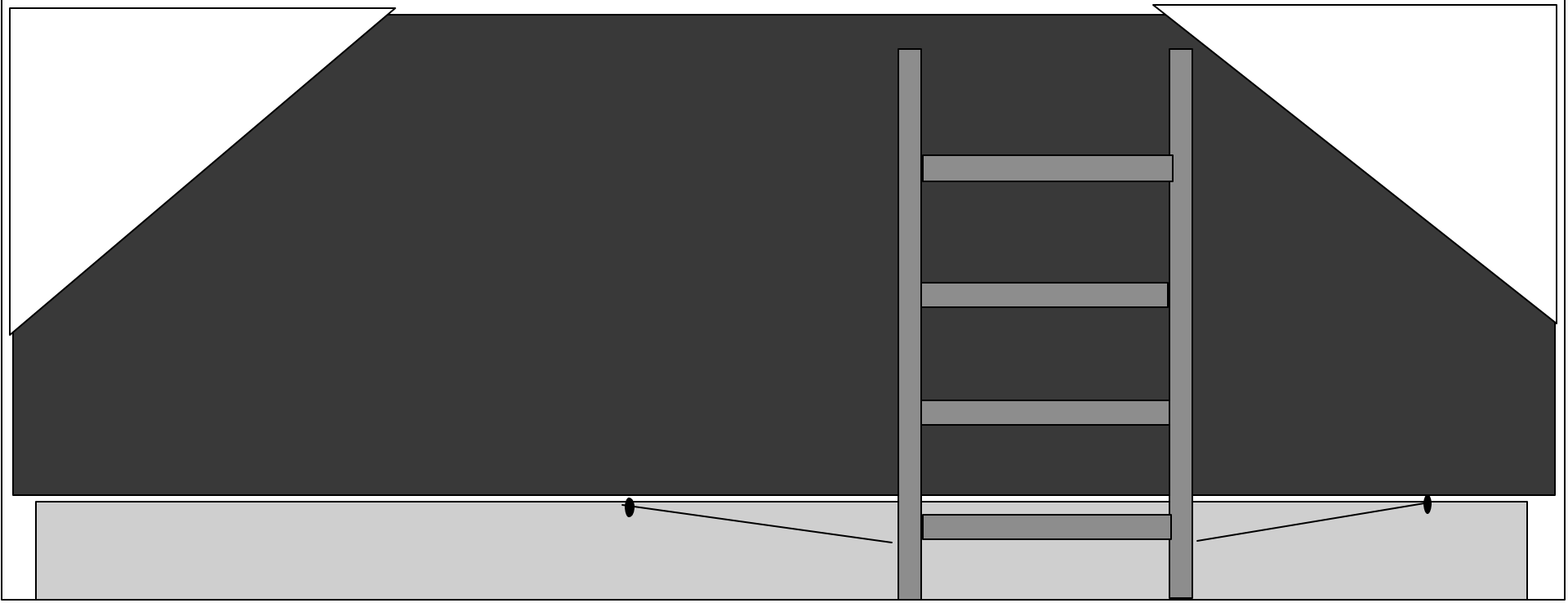
- Use two people where ever possible; one at the bottom to hold the ladder while one climbs to secure it.

- If no one is available to help, the ladder should be lashed back within the bottom 2 feet of the ladder using:
  - #9 or better wire,
  - 3/8 “ rope, or
  - cleat using a 2 x 4 to the floor surface to prevent displacement when climbing to secure the top.

IV Setting up

- Secure the ladder at the top by putting the rope or wire through the holes in the side rail of the ladder or by tying the rails individually.

- Use a sixteen penny nail placed at a 30-45 degree angle for maximum stability.



IV Setting up

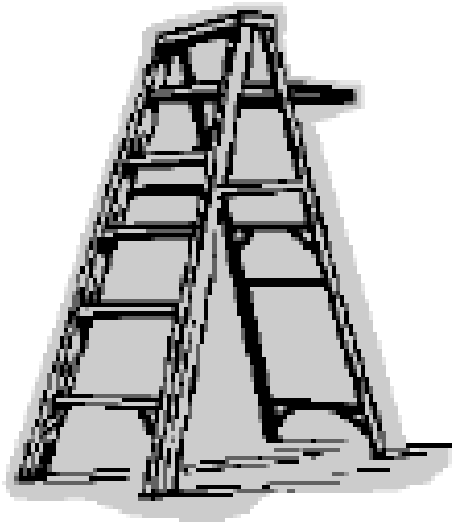
- Support the upper ladder equally on both of its side rails, not the rung.

- If leaning the ladder against a pole or similar structure where you can’t support the ladder equally on both side rails, use a pole grip and strap or other type of single support attachment

IV Setting up

Standard stepladder

- Must have a metal spreader or locking device to hold the front and back sections in an open position when the ladder is being used.



IV Setting up

Specific rules for ladder set up

- Never place ladders on top of anything such as boxes, barrels, scaffolds or other unstable bases to gain additional height.
- Place the ladder near the work you will be doing
- Place a solid rest for the rail tops across windows and poles
- Do not tie or fasten ladders together to make a longer ladder
- Don’t leave unsecured ladders unattended.
- Overlap the fly section with the lower base section 1/12the the total working height.

V Use

- Many falls from ladders occur as a result of simply not using ladders according to safe use guidelines. The following represents a list of rules to follow when using ladders:
  - use ladders only for the purpose they were designed to be used for
  - Never step over the top of the ladder
  - Face the ladder and keep your belt buckle between the rails for proper balance
  - Keep three points of contact: two hands and a foot or two feet and a hand.

V Use

- Do not carry heavy or bulky objects. Use a bucket and rope or a tool belt.
- Do not hurry up a ladder
- Do not move the ladder while anyone is standing on it
- Do not have more than one person at a time on a ladder unless the ladder’s designed for it
- Do not use ladders as a platform

V Use

- Make sure your shoes are clean before you climb
- Do not place tools or material on a ladder as they could fall off
- Do not work on ladders during a severe storm or strong wind
- Do not work on ladders which are covered with ice or snow

V Use

Standard stepladder

- Do not use the top two steps as a step
- Do not climb cross-bracing on the rear section of the ladder
- Bottoms of all four side rails must be used on firm level ground, have nonslip material

VI Maintenance & Storage

- Periodic maintenance and proper storage will extend a ladder's life and cut replacement costs.
- Maintenance includes little more than inspecting the ladder for damage, tightening connections and lubricating movable parts.
- Neglected ladders quickly become unsafe ladders.

VI Maintenance & Storage

- Follow manufacturers instruction for ladder use, care, and repair first.
- Lubricate all metal bearings of locks, wheels, pulleys and other moving parts periodically. Be sure to wipe off excess oil.
- Employers who use many ladders should consider stocking repair parts.
- Keep ladder rungs, cleats and steps free from dirt, oil or grease.

VI Maintenance & Storage

- Wood ladders:
  - Do not paint. May seal with linseed oil or similar product
  - Replace lower steps on wooden ladders when one-fourth of the step surface is worn away.
  - Store promptly after use. Do not expose to moisture or excessive heat. Avoid storing ladder near stoves, steam pipes or radiators.
  - Exposure to moisture and sun will shorten the life of a wood ladder.

VI Maintenance & Storage

Stepladders:

- Store vertically in a closed position to reduce sagging or twisting.
- Ladders stored vertically should be secured to prevent them from falling over onto persons passing them.
- Tighten rods of steps frequently.

Extension ladders:

- Should be stored horizontally supported on hooks every six feet. Do not store items on top of a ladder or block access to a ladder

Remember my first question?

Do we need ladder training?