

# 5

# Safety

## Objective

Students will be able to:

- Compare and contrast shop hazards.
- Identify the proper use of personal protection items.
- Identify and analyze an MSDS.
- Compare and contrast the safe handling of electrical items.
- Compare and contrast the safe usage of shop equipment.
- Select the proper fire extinguisher.
- Compare and contrast a HAZMAT compliance plan.



## Orienting Questions

- ✓ Do you know about shop safety?
- ✓ Do you know about fire safety?
- ✓ Do you know how to use personal protection items?
- ✓ What is a MSDS?
- ✓ Who is OSHA?
- ✓ What is a HAZMAT plan?



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*\*\*\*Closed Captions and transcripts are available for all videos in this module.*

*Click the  button at the bottom right of the play menu to turn on closed captions in the language of your choice. You may also read a full transcript of the video by clicking the  bottom of the play menu. If the YouTube closed captioning is not accurate, there will be an indication that the transcript is attached at the end of the module. \*\*\*\**



A black arrow pointing to the right inside a lavender circle is the symbol used for activities which are non-graded assignments.



A black arrow pointing to the right inside an orange circle is symbol for a graded assignment.



A black question mark in a lavender circle is the symbol for a practice test.



A black question mark in an orange circle is the symbol for a graded test.

**PRE-TEST**

Please take the pretest to evaluate how much you already know about safety.

1. What is the acronym for the federal agency that oversees workplace safety?
  - A. NIMH
  - B. DOT
  - C. IRS
  - D. OSHA
2. Safety Glasses will protect the eyes while welding.
  - A. True
  - B. False
3. Which of the following is an example of a blood-borne pathogen?
  - A. Cancer
  - B. The Cold
  - C. Hepatitis C
  - D. Arthritis
4. A water hose will safely extinguish most shop fires.
  - A. True
  - B. False
5. A \_\_\_\_\_ is the acronym for a sheet that explains the ingredients and safe use of a product or chemical.
  - A. WWE
  - B. CBS
  - C. MSDS
  - D. NRA
6. All AC circuits are deadly, while all DC circuits are safe.
  - A. True
  - B. False
7. Fire extinguishers should be located in locked flammable cabinet.
  - A. True
  - B. False
8. Which type of jewelry is safe to be worn in a shop?
  - A. Necklaces
  - B. Rings
  - C. Bracelets
  - D. None of the above

9. Eye injuries rarely happen in automotive repair shops.
- A. True
  - B. False
10. Toxic exposure to the lungs does not always present with immediate symptoms.
- A. True
  - B. False
-

## INTRODUCTION

The automotive service and repair industry offers many great opportunities, but with opportunity comes potential hazards. In the automotive industry shop safety is critical for consumers, businesses, and employees. This module is designed to inform students of potential health and safety hazards present in the automotive repair industry. The goal of this module is to raise awareness of safety hazards while providing examples of hazard prevention. Please take a couple of minutes to watch this introductory video. To access the video, please click on the Video 1 image.



Video 1 – Introduction (York Technical College, Public Domain)

For a transcript of this video, please click on [transcript](#).

For the embed code for this video, please click on [embed](#).

## 5.1 EYE PROTECTION

Injuries to an eye or eyes represent 7.8 % of automotive industry accidents. This number is astonishing considering eye injuries in all other industries represent only 2.8% of accidents. OSHA estimates that nearly 2000 eye related injuries occur daily, a third of which require emergency medical treatment. Eye related injuries range from simple to severe, with symptoms that range from minor irritation to total blindness. The majority of eye related injuries occur from foreign particles become embedded in or

scratch the cornea or outer surface of the eye. The foreign particles may include dust, wood, metal, or concrete. Particles typically enter the eye as a result of being blown in by wind or air, fall in while working below a vehicle, or are ejected in from tool use. In most cases this type of injury can be treated by simply flushing the affected eye with water or a saline solution until the particles are removed. If multiple attempts to flush out the eye fail to remove a particle medical treatment may be required to remove an embedded material. Either scenario usually results in redness and minor irritation to the eye but rarely result in any serious damage to the eye. Figure 1 is an **eye wash station**; a sink designed to push the water upward and is used for flushing out your eyes.



Figure 1 – Eye Wash Station at Harpoons Brewery (Ginger Dewey, CC BY – NC – ND 2.0)

Image of an eye wash station

Please watch this video on the benefits of an eye wash station. To access the video, please click on the video 2 image.



Video 2 – Eye Wash Station (York Technical College, CC BY)

For a transcript of this video, please click on [transcript](#).

Amazingly the human eye is one of the fastest healing organs in our bodies, typically recovery from this type of injury in just one night's sleep. More severe eye related injuries include blunt force trauma to the eye or socket, chemical burns, or thermal burns. Blunt force trauma involves the impact or penetration by a large or sharp object. This injury results in the damage of the eye socket, and or the eye itself. This type of injury requires immediate emergency medical attention. Failure to treat this type of injury promptly may result in vision problems, or even permanent blindness. Chemical burns are the result of corrosive or toxic materials coming in contact with the eye. These are usually the result of a substance being splashed or sprayed in to the eye. Common chemicals such as industrial cleaners, acids, and paint materials are the usual culprits of this type of injury. Chemical burns to the eyes require not only immediate medical attention but may also require extensive flushing of the eyes immediately after exposure. It is important that technicians are aware of the response procedures required for any chemical exposure prior to performing any related tasks. Failure to treat these types of injuries can result in vision loss and/or blindness.

Thermal burns are the result of heat or ultra-violet radiation damaging the eye and surrounding tissue. Thermal burns can be caused by exposure to steam, fire, or welding flash. Thermal burns require immediate medical attention, and can result in vision loss and/or blindness. While injuries are more common technicians must also be aware of the environmental dangers that can affect the eyes. Workers may be at risk of acquiring infectious diseases through ocular exposure. Diseases such as Hepatitis, HIV, Flu's, Etc. can pass through the mucous membrane of the eye resulting in direct pathogen exposure.

While some accidents are unavoidable, most eye related injuries can be prevented with proper training and the implementation of an eye protection protocol. Because the majority of eye related injuries are the result of negligence, OSHA now requires employers to create and enforce eye protection safety plans. These plans begin with an enforced requirement of standard **safety glasses**, glasses that meet OSHA standards and protect the eyes from the sides as well as the front. Studies reveal that the use of standard safety glasses can lower minor eye related injuries by more than 80%. Safety glasses come in many shapes and sizes, and can vary in expense. Most prescription glasses do not qualify as safety glasses although some can be modified with the use of attachments to be compliant. The next step in an **eye protection plan** is training. The training will explain the proper use of supplemental eye protection as well as the proper handling of an eye related injury. Supplemental eye protections are items used in conjunction with safety glasses for additional protection for work specific situations. The video below shows real time hazard avoided by eye protection.

Please take a few minutes to watch this video on safety glasses. To access the video, please click on the Vide 3 image.





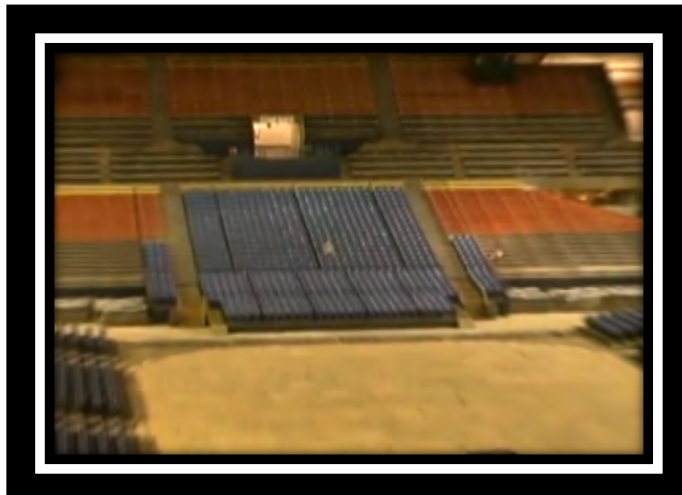
Video 3 – Eye Protection (York Technical College, CC BY)

For a transcript of this video, please click on [transcript](#).



## ACTIVITY 1 – EYE PROTECTION

Please take a few minutes to view this video on eye protection. To access the video, please click on the Video 4 image. After watching this video, record your thoughts in a journal. (This is a non-graded assignment.)



Video 4 – Eye Protection (PublicResourcesOrg, CC – BY)

For a transcript of this video, please click on [transcript](#).

## 5.2 CLOTHING/JEWELRY/HAIR

A technician's job requires working closely to moving parts, live electrical components, and in tight spaces. For these reasons proper groomed hair and correctly sized and properly worn clothing is a necessity. Jewelry should be avoided at all times during work as it is the most dangerous item in this topic. This by no means says you cannot appear industry fashionable. The point of this topic is to provide you the information to be safety conscious of your attire and appearance.

Well fitted properly worn clothing is clothing that comfortably covers the skin without hanging loose or sagging. Loosely hanging clothes can get snagged on sharp objects or caught between moving objects. Oversized shirts have been known to get caught by belts or fans causing serious injury or death. Baggy oversized pants can get caught on sharp objects causing cuts or even falls. These pants can also multiply the effects of slippery floors, limiting balance and making simple slips become dangerous falls.

Figure 2 illustrates pants that should not be worn in a shop. Please take a couple of minutes to observe the style pants and the way they are being worn.



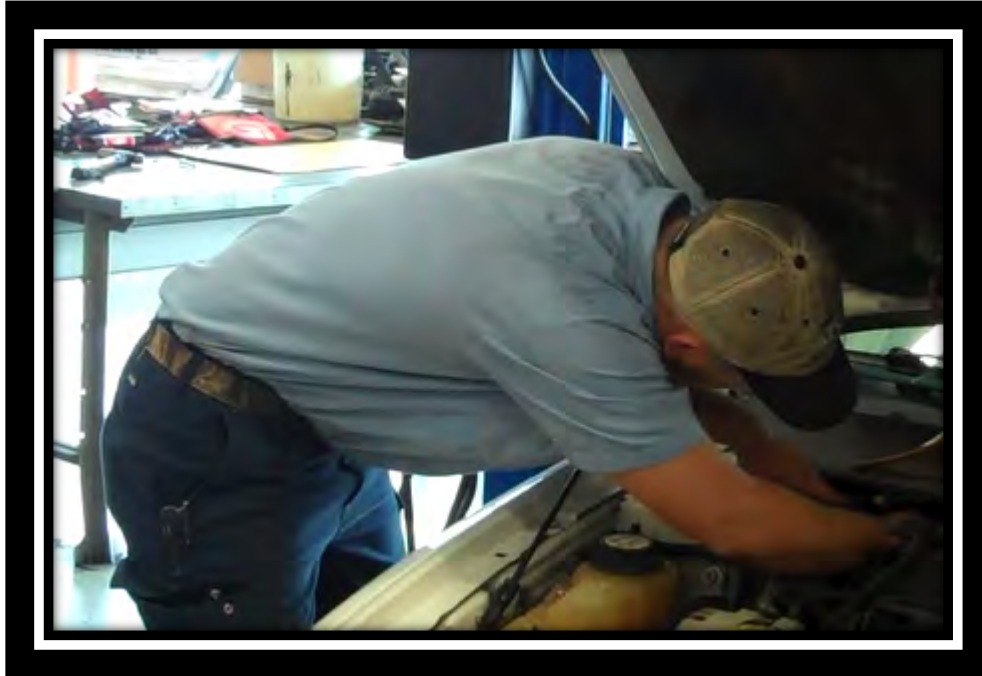
Figure 2 – Puma on the Tube (Oxfordian, CC BY – ND – 2.0)  
Image: Man wearing baggy sweats pants

Men and women in the automotive industry have every right to have long hair. Unfortunately with this right comes a level of personal responsibility and safety. Long hair should be properly groomed and tightly bound behind your body. Hair can even be tucked into the back of a shirt, or secured using a hat. The dangers of long loose hair include getting tangled or caught in moving parts. Loose hair can also lie on hot parts and potentially catch fire. Typically hair related accidents are humorous events resulting in an unexpected trim but serious injury or death could occur if hair were to enter an engine belt running at speed.

Jewelry is the most dangerous item in this topic because it poses multiple safety hazards. Loose hanging jewelry poses the same dangers as clothing or hair in that it can get caught in moving parts such as fans or belts. Rings, watches, and bracelets can get caught or stuck potentially resulting in the loss of a finger or hand. The factor that makes jewelry even more dangerous is that most jewelry materials conduct electricity. Shorting jewelry between a vehicle battery and ground on conventional

vehicles can result in severe burns or potential loss of limb. Shorting jewelry on a hybrid vehicle battery can result in serious injury or death.

Please take a few moments to watch Video 5 which address how a uniform should fit. To access the video, please click on the Video 5 image.



Video 5 – Uniform (York Technical College, CC BY)  
For a transcript of this video, please click on [transcript](#).

### 5.3 SHOES

Work in a shop usually consists of long days standing on hard concrete floors. Technicians are required to lift heavy items, and at times work with heavy items above their heads. Shop floors may also be very slippery at times throughout the work day. For these reasons it is important for technicians to have shoes that offer both comfort and protection. Sneakers or tennis shoes may provide comfort but they offer very little protection from falling objects or hot sparks. On the other hand steel toed boots may offer protection but lack comfort and mobility. Shoes are available for technicians that offer comfort, protection, and are equipped with slip resistant soles.

## 5.4 SKIN PROTECTION

The most commonly overlooked hazard in a shop environment is skin protection. Most technicians work throughout the day leaving their skin totally exposed to dangerous chemicals, toxins, and burns. Chemicals and toxins can be absorbed through the skin posing short and long term health risks. Skin protection begins with routine washing of affected areas on the skin and hands. While washing highly reduces absorption, remember that tasks that require direct contact with chemicals require additional protection. Elbow length industrial rubber gloves should be used for tasks such as washing parts. When welding or heating metal, technicians should wear industrial leather or heat resistant gloves to prevent serious contact or UV burns to their hands. Leather covering clothes are also available to protect the arms, feet, and torso while welding overhead. In recent years technicians have adopted the use of medical style gloves. Medical style gloves protect the hands from minor cuts and scrapes limiting infections. Medical gloves also protect the hands from minor chemical exposures that are usually overlooked.

Show below in figures 3 – 6, you will see various types of gloves that are worn in an automotive shop.



Figure 3 – 781 (Jonathon Stewart, CC  
BY – NC – ND – 2.0)  
Image: GoJo gloves



Figure 4 – 783 (Jonathon Stewart, CC  
BY – NC – ND – 2.0)  
Image: Leather gloves that extend to the  
elbow.



Figure 5 – 795 (Jonathon Stewart, CC BY – NC – ND – 2.0)  
Image: Medical Style Gloves



Figure 6 – 782 (Jonathon Stewart, CC BY – NC – ND – 2.0)  
Image: Elbow length gloves gloves

Please take a couple of minutes to watch this video on skin protection. To access the video, please click on the Video 6 image.



Video 6 – Skin Protection (York Technical College, CC BY)  
For a transcript of this video, please click on [transcript](#).

## 5.5 DISEASE PROTECTION

Disease protection in a shop environment requires both consideration and awareness. Because shops require people to interact constantly, the chances of communicable diseases to spread are very high. It is important that sick people follow a doctor's orders and stay away from work if they are contagious. This situation usually applies to air-borne illnesses such as colds or flu's. Blood-borne illnesses are diseases that are transferred by the direct exposure of blood or bodily fluids from an infected person to the eyes, mouth, or open wounds of a non-infected person. Technicians should inform their fellow co-workers of any contagious diseases or illnesses that they may have. These illnesses include blood-borne pathogens such as hepatitis, HIV, or Staphylococcus. Technicians commonly receive cuts and scrapes to the hands and arms making exposure to blood-borne pathogens possible. Technicians should receive regular vaccinations for diseases such as tetanus, as cuts and scrapes are usually the result of metal objects. As stated above it is critical that technicians be aware of potential diseases, and use caution when dealing with blood or other bodily fluids. Technicians must also be aware of exposure through items that may be left or hidden in a vehicle such as hypodermic needles. In the event emergency treatment is required in the shop, items such as gloves and glasses should be worn before attempting to perform first aid to another person. In the event you or a co-worker becomes exposed to blood or bodily fluids, wash the affected area thoroughly and seek immediate medical attention.

## 5.6 EAR PROTECTION

According to OSHA exposure to noise levels exceeding 85 decibels for extended periods can lead to occupational hearing loss. Noise in a shop environment usually exceeds this level throughout the work day. Air tools along with engines running in a confined location can generate harmful levels of noise. Simple foam earplugs will provide adequate protection to a technician's hearing. Ear plugs can also provide protection from foreign particles entering the ear canal while working under a car or while welding. In extreme cases foam ear plugs may be supplemented by the use of head-phone type hearing protectors.

Figure 7 and 8 show two types of ear protection.

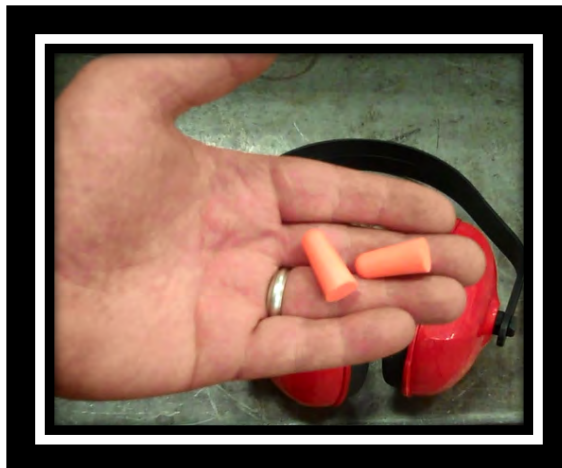


Figure 7 – 797 (Jonathon Stewart, CC  
BY – NC – ND – 2.0)



Figure 8 – 798 (Jonathon Stewart, CC  
BY – NC – ND – 2.0)

Please take a couple of minutes to watch this video on ear protection. To access the video, please click on the Video 7 image.



Video 7 – Ear Protection (York Technical College, CC BY)  
For a transcript of this video, please click on [transcript](#).

## 5.7 RESPIRATORY PROTECTION

Automotive repair forces technicians to be exposed to a wide assortment of toxic fumes, and particles. Products varying from paints, cleaners, to brake pad dust all pose potentially dangerous effects to the human respiratory system. Unfortunately respiratory protection is widely overlooked as exposure to many of the common toxins do not produce short term symptoms. Diseases such as mesothelioma caused by exposure to airborne asbestos, can take decades before becoming symptomatic. Because of this silent, yet deadly, hazard proper training and awareness are critical to ensure technician safety.



### ACTIVITY 2

The video below discusses different types of respirators, proper usage, and maintenance. To access the video, please click on the Video 8 image. Once you have watched the video, record your thoughts in a journal. This is a non-graded assignment.



Video 8 – RESPIRATOR TYPES #safety #respirator #OSHA (James Parks, Standard YouTube License)

For a transcript of this video, please click on [transcript](#).



## 5.8 TOOL SAFETY

Tools are a technician's best friend and their means to a profitable career in automotive repair. Most tools are strong, many carry lifetime warranties, but they are not invincible. Hand and power tools both require regular inspections and maintenance. Hand tools can become worn over time, handles crack, and grips can become loose. As this occurs these tools must be replaced or serviced to prevent slippage resulting in injury to the technician. Power tools must be inspected for cracks, leaks, or electrical frays. These concerns should be addressed immediately as some could lead to electrocution and death. Tool safety also includes the proper use of tools for their dedicated purpose. A common example is a screwdriver being used as a chisel. This common error stresses both the shaft and handle of the tool leading to potential failure and injury. Proper maintenance and tool application usage will greatly lower the chances of tool related injuries.

Figure 9 shows a hammer that the top of the handle has been taped back together. This would not be a suitable repair.



Figure 9 – THOR's hammer and framing square DSC\_0544 (el cajon yacht club, CC BY – 2.0)

Image: hammer with taped handle and framing square

## 5.9 ELECTRICAL SAFETY

Electrical safety is paramount in automotive repair today as many of the rules in the past have changed. Traditional thinking in relation to electricity was that direct current (DC) was safe and Alternating Current used in shops and homes was deadly. While not completely true this way of thinking has some merit, as 12 volt battery systems may cause severe burns or fire they do not directly cause death by electrocution.

The use of the term “traditional,” is because modern vehicles and especially hybrid vehicles are a new exception to the rule. More sophisticated vehicles and hybrids require battery voltages that are higher than the usual 12 volt systems. Although these systems are still DC systems the higher voltages and current potentials can lead to potential electrocution and death. High voltage vehicles require proper training, and equipment before any services are performed. Manufacturers distinguish high voltage circuits in vehicles by covering them in a bright orange coating for easy identification. Regardless of the type of system technicians should use caution while servicing any electrical systems following service materials, and using proper tools and equipment.

Shop electricity also can pose as a safety hazard especially since shops regularly have wet floors. Routine inspections of outlets, ground fault circuits, and cords can greatly reduce the chances of electrocution. Specialty insulated tools, and shock resistant gloves are available and provide extra protection for the cautious technician.

Video 8 addresses electrical safety and electrical fires. Please take a few minutes to watch this video. You may access the video by clicking on the Video 9 image.

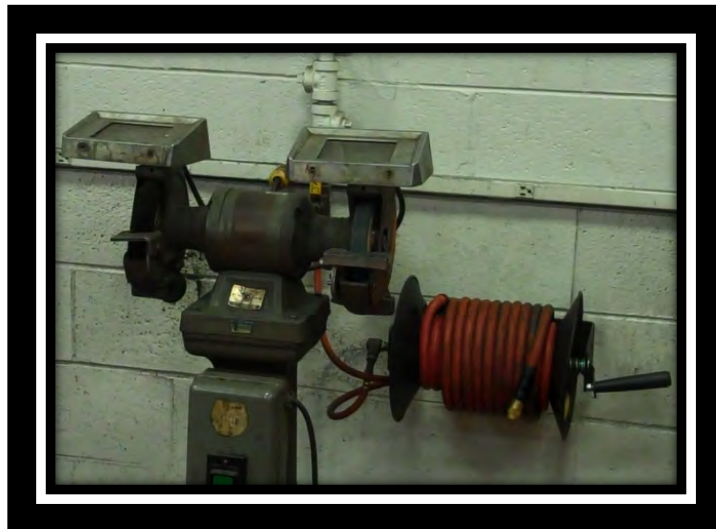


Video 9 – Electrical Safety (York Technical College, CC BY)  
For a transcript of this video, please click on [transcript](#).

## 5.10 EQUIPMENT SAFETY

Most shop equipment comes equipped with stickers depicting grisly images of potential hazards that may occur during use. While appearing humorous, these depictions typically represent accidents that have actually occurred. Equipment safety begins with proper training that emphasizes potential hazards. Equipment also requires routine maintenance and inspection to ensure proper and safe operation. A properly operating piece of equipment used by a trained professional greatly reduces the risk of hazards and injury. The video below demonstrates proper lift operation, maintenance, and safety.

Please watch Video 10 on equipment safety. To access the video, please click on the Video 10 image.

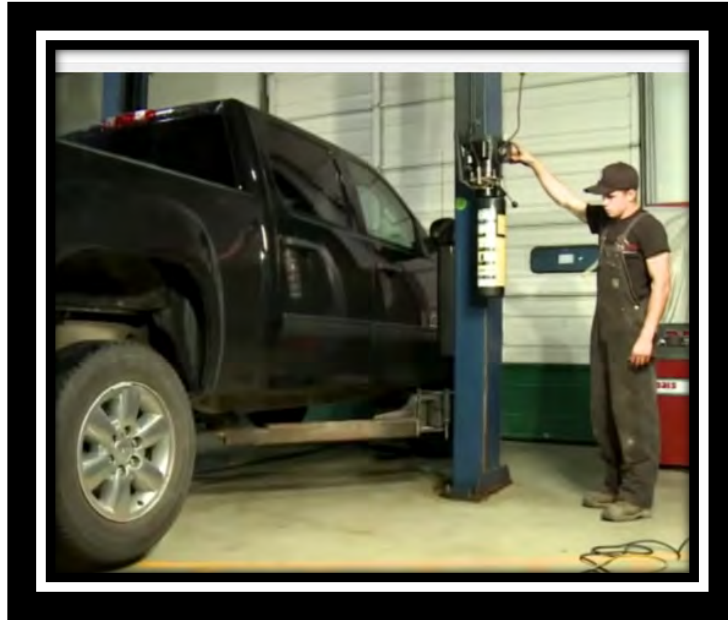


Video 10 – Equipment Safety (York Technical College, CC BY)  
For a transcript of this video, please click on transcript.



### ACTIVITY 3

Please watch Video 11 which may be accessed by clicking on the Video 11 image. After watching the video, record your thoughts in a journal. This is a non-graded assignment.



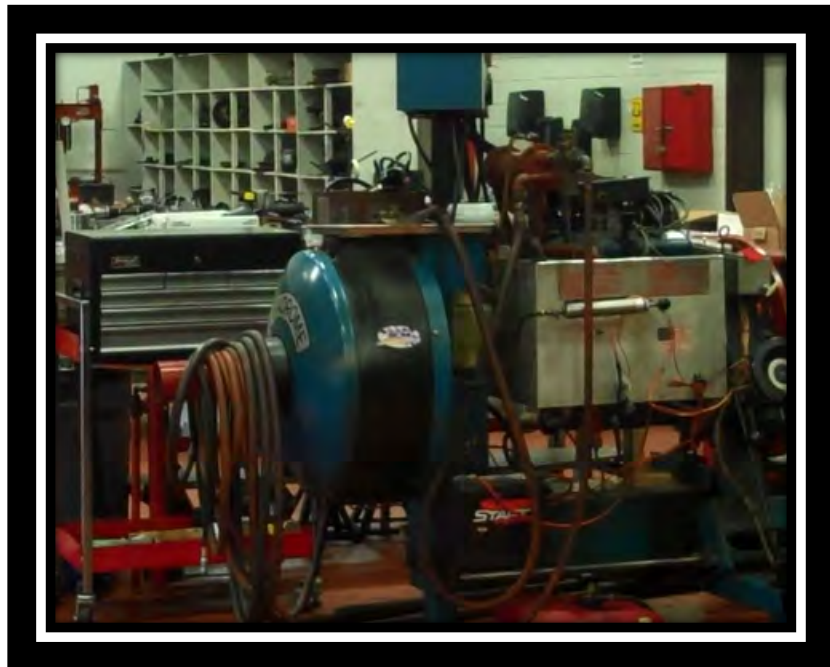
Video 11 – Automotive Lift Safety Awareness (AutoLiftSafety, Standard YouTube License)

For a transcript of this video, please click on [transcript](#).

## 5.11 WORK AREA SAFETY

In a shop a busy day can lead to a dirty work environment. This fact, while unavoidable, can be managed by awareness and action. Performing a complete cleanup between jobs is unpractical and unproductive. Oils, coolant and other liquids puddled on the floor pose a slip hazard and also make it difficult to work in. Walkways cluttered with parts and trash can lead to potential tripping and/or falls. These risks can affect not only the technician, but also coworkers and customers. A technician can keep a safe work area by simply cleaning or maintaining slippery spills when they occur and by keeping walkways clear of objects. This policy not only promotes safety, but it also promotes courtesy and professionalism.

Please watch Video 12 on assessing your shop for awareness and safety. To access the video, please click on the Video 12 image.



Video 12 – Shop Safety (York Technical College, CC BY)  
For a transcript of this video, please click on [transcript](#).

## 5.12 FIRE SAFETY

In the shop and inside vehicles technicians are surrounded by numerous flammable objects, liquids, and chemicals. Some are considered as extremely flammable or even explosive. For this fact and to eliminate confusion or surprise, a good practice is to assume everything is flammable and develop a fire safety plan. Fires occur suddenly, without warning, and spread rapidly.

Fire safety plans cannot prevent fires, what they can do is provide the training and tools necessary for immediate control and extinguishment. Fire safety plans include clear paths of escape, abundant clearly labeled fire extinguishers, and employee training that promotes instinctive reaction.

Please watch Video 13 and Video 14 on fire extinguishers. To access the videos, please click on the respective video images



Video 13 – Fire Extinguishers (York Technical College, CC BY)  
For a transcript of this video, please click on [transcript](#).



Video 14 – Fire Extinguishers (York Technical College, Public Domain)  
For a transcript of this video, please click on [transcript](#).  
For an embed code for this video, please click on [embed](#).

A fire extinguisher is the main line of defense for technicians against fire. A shop should be well equipped with extinguishers located within 50 feet, by law, but practically within 15 feet of a bay. Fire extinguishers are available in classes containing chemicals designated to extinguish certain types of fire. Class A extinguishers are for use on wood and paper fires. Class B extinguishers are for use on flammable liquids such as gasoline. Class C extinguishers are for use on electrical fires. Because automotive shops and vehicles may exhibit all three classes of fire combination extinguishers such as AB, BC, or ABC should be installed to limit confusion. Extinguishers must be clearly marked and regularly serviced by law and to provide maximum effectiveness. Fire extinguishers are a must and by no means should water or air be used to extinguish a vehicle or shop fire.

Flammable materials must be stored correctly. Please watch Video 15 to learn more about flammable material storage. To access the video, please click on the Video 15 image.



Video 15 – Flammable Material Storage (York Technical College, CC – BY)  
For a transcript of this video, please click on [transcript](#).





## ACTIVITY 4

Please watch Video 16 by clicking on the Video 16 image. After watching the video, record your thoughts in a journal. (This is a non-graded assignment.)



Video 16 – Fire Extinguisher Training Video (JCFD3, Standard YouTube License)  
For a transcript of this video, please click on transcript.



## ASSIGNMENT 1







Figure 10 Fire Extinguishers (Jonathon Stewart, CC BY – NC – ND – 2.0)  
Image: Fire extinguisher with a red cylinder

Information: A fire extinguisher is a portable device used to eliminate or control fires in emergency situations. Fire extinguishers are considered active devices because a properly service extinguishers is ready for use at any time on demand. A fire extinguisher consists of a cylinder with a gauge, control handle, and a directing hose. The cylinder comes filled with a fire extinguishing agent with ingredients determined by the fire classification. The illustration above is an example of 16 lb. multi-use ABC class fire extinguisher similar to the ones present in most automotive shops. Portable fire extinguishers come in varying sizes from 1 to 30 lbs. Commonly shops will be equipped with extinguishers ranging from 10 to 30 lbs. with the 16 lb. being the most common. The illustration above shows usual red cylinder which is not by coincidence, shows the fire classifications, and provides operator instructions. Fire extinguishers are either colored red or silver to prevent confusion. Silver fire extinguishers should never be

used on automotive type fires as the contain water and can make certain fires worse. Silver fire extinguishers are Class A only, all other classes are red. If you grab a red fire extinguisher use the pictograms on the label for quick reference of proper usage. It is critical that technicians know how to properly operate and identify a fire extinguisher. It is equally important that technicians understand that fire extinguishers are only small portable devices for handling small fires. Fire extinguishers are not an alternative to the fire department. Fires that are out of reach or in remote area such as high ceilings or on roofs should be handled by professional fire fighters.

Exercise: The Illustrations below include some of the pictograms used on fire extinguishers. Label each pictogram with its correct fire usage and classification. Copy and paste the images as needed and submit your answers to the drop box.

#1	#2	#3	#4
			
Figure 11 – Trash can on fire and campfire (Jeffery Clade, CC BY – NC – ND – 2.0)	Figure 12 – Gas can pouring fluid on flames (Jeffery Clade, CC BY – NC – ND – 2.0)	Figure 13 – Electric Plug on fire (Jeffery Clade, CC BY – NC – ND – 2.0)	Figure 14 – Frying pan with flames (Jeffery Clade, CC BY – NC – ND – 2.0)
Image: Trash can on fire and campfire	Image: Gas can pouring fluid on flames	Image: Electric Plug on fire	Image: Frying pan with flames



ASSIGNMENT 2

Complete the chart and post to the drop box under fire extinguisher analysis

Fire Class	Color	Use	Mnemonic
A	GREEN	Ordinary solid combustibles	A for "Ash"
B	RED	Flammable liquids	B for "barrel"

Fire Class	Color	Use	Mnemonic
		and gases	
C	BLUE	Energized electrical equipment	C for "Current"
D	YELLOW	Combustible metals	D for "Dynamite"
K	BLACK	Oils and fats	K for "Kitchen"
ABC	GREEN/RED/BLUE	Multi-use	Tri-Class

Use the chart above to identify the correct type/or types of fire extinguisher to for the following materials.

Fire Extinguisher Class	Material on Fire
	Wood
	Motor oil
	A vehicle
	A shop wall
	A piece of electrical shop equipment
	Shop rags
	Gasoline
	Newspapers
	Paint
	Battery
	Electrical panel
	Trash can
	Cooking oil
	A computer
	Plastic
	Magnesium
	Air compressor
	Heater
	The ceiling or roof

### 5.13 HAZMAT

Shops are required by law to have an approved **HAZMAT** (Hazardous Material) plan for the handling, containment, and disposal hazardous materials. These materials include used oils, gas, coolant, oil filters, solvents, and paint products. Hazmat plans require shop owners to provide safe adequate storage for these items, and to have the ability to

react and contain a potential spill. Shop owners are made fully responsible for proper storage and disposal of these materials, and improper handling can result in stiff penalties and fines. In the past HAZMAT plans posed a substantial expense to shop owners, fortunately, today rising energy prices have made yesterday's waste into a hot commodity. Today companies compete and even pay to get this waste and recycle it for reuse. This development has made HAZMAT plans easier to implement but shop owners still maintain the responsibility of handling and storage.

Please take a few minutes to watch Video 17 on HAZMAT. To access the video, please click on the Video 17 image.



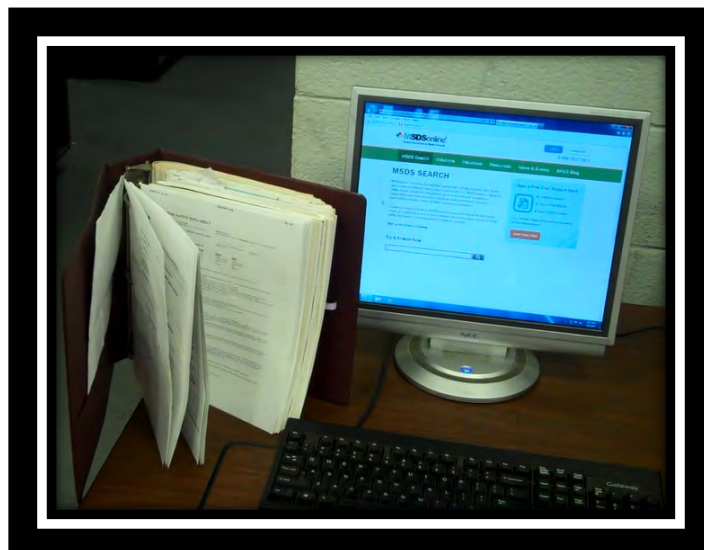
Video 17 – HAZMAT (York Technical College, CC – BY)  
For a transcript of this video, please click on [transcript](#).

## 5.14 MSDS

Becoming aware of the potential hazards from chemicals and toxins has been the goal of this module. During a brief walk through the YTC shop, the author counted 58 different chemical products, from different manufacturers; with different ingredients. Now, what do you do if you are accidentally exposed or ingest any one of these products? Unfortunately it would be impossible to learn what to do for thousands of different products. For this reason we use **MSDS** (Material Safety Data Sheets) provided by the manufacturer. Shops are required to provide quick access to this information either in paper form or online to their employees. These sheets provide all the necessary information needed to handle accidental exposure. An example of this is

a common contradiction to normal human instinct. If a person swallows something accidentally the natural response would be to vomit. With this in mind why would a label say: “if swallowed do not induce vomiting”? The reasoning is that an acidic product will damage the esophagus when swallowed but do less harm to our already acid filled stomachs. If this product is vomited the esophagus could receive more damage than when it was consumed. Basically the product is safer staying in the stomach while awaiting medical attention.

Please take a few minutes to watch this video on Material Safety Data Sheets. To access the video, please click on the Video 18 image.



Video 18 – MSDS (York Technical College, CC BY)  
For a transcript of this video, please click on [transcript](#).



#### ACTIVITY 5

Click on [STP](#) (Link 1, CPID, All Rights Reserved) to locate the STP gas treatment MSDS:

Use the MSDS sheet to answer the two questions below.

1. What should you do if STP Gas Treatment is ingested?
2. What is the flash point of STP Gas Treatment?

This is a non-graded activity.

## 5.15 OSHA

The Occupational Safety and Health Administration (**OSHA**) was created in 1970 as an agency of the Department of Labor. OSHA's mission is to:

...assure safe and healthful working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education and assistance.

*This passage is taken from the About OSHA website.  
Reference 1, OSHA, Public Domain*

OSHA is responsible for setting workplace safety and health standards as well as providing their enforcement. OSHA regulates health items such as exposure to chemicals, and sets requirements for personal protective equipment and safety regulations. OSHA also insures that employees are made aware of safety requirements and regulations through mandatory publications. OSHA is responsible for an estimated 7 million workplaces with only a few exceptions such as the postal service, and FAA.

## 5.16 DEVELOPING COMMON SENSE

Many of the safety related hazards can be avoided by simply using common sense. Using a common sense approach has the ability of not only promoting safety but also increasing productivity. These methods can be implemented easily requiring little to no expense.

Examples of the common sense approach to safety include:

- Store flammable materials together in a flammable cabinet
- Store welding shields, gloves, and protect clothing with or on a welder
- Hang a face shield on or near any grinders
- Have a spill kit next to oil storage

Please take a few minutes to watch this video on common shop sense. To access the video, please click on the Video 19 image.



Video 19 – Common Shop Sense (York Technical College, CC BY)  
For a transcript of this video, please click on [transcript](#).





## ASSIGNMENT 3

Use the floor plan design below to complete this activity.

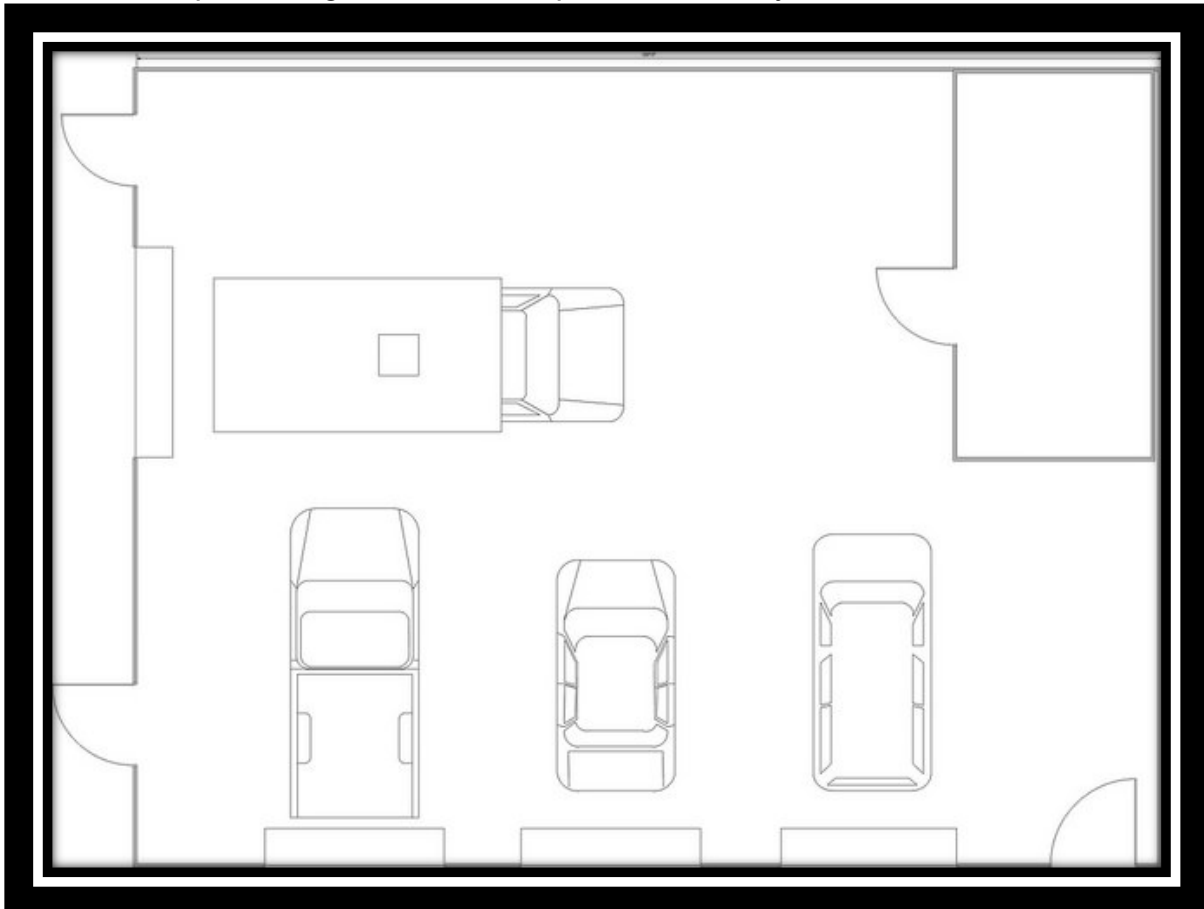


Figure 15 – Module 5 Floor Plan (Jonathon Stewart, CC BY – NC – ND – 2.0)

Image 4 vehicle automotive shop

Use your critical thinking skill to properly lay out the shop in the image above. Use the item list below to place the items in the best possible locations. Feel free to draw or just use the item number as a reference point. Make sure you use common sense along with the information learned in this module to complete this assignment.

1. 7- fire extinguishers
2. 1- flammable storage cabinets
3. 2-grinders
4. 2-eye wash stations
5. 3- exit signs
6. 1-waste oil tank
7. 2-HAZMAT spill kits
8. 1-welding table
9. 1-drill press
10. 1-solvent based parts washer

**ASSIGNMENT 4 – DISCUSSION****DISCUSS YOUR FLOOR PLAN LAYOUT IN THE CRITICAL THINKING**

**ASSIGNMENTS.** Compare and contrast the designs of your fellow students. Use your critical thinking skills to assist your classmates and submit a final plan that your class or group agrees is the best final layout.

**ACTIVITY 6**

List two additional ways you could use common Sense to enforce Safety. Record answers in your Journal. This is a non-graded activity.

**MAJOR CONCEPTS****KEY CONCEPTS**

Summarize the module into a small list of major concepts (Aim for between 3 and 5 and be sure that some relate to your learning outcomes). Use bullets to distinguish each concept and write a few sentences explaining the concept. Address the following as you summarize the module.

- Safety Items
- Personal Safety
- Safety in the Shop
- Fire Safety
- Common Sense Safety
- HAZMAT Essentials
- OSHA Essentials

**KEY TERMS**

- Eye Protection Plan
- Eye Wash Station
- HAZMAT
- MSDS
- OSHA
- Safety Glasses

## GLOSSARY

- [Eye Protection Plan](#) – plan that begins with an enforced requirement of standard safety glasses that meet OSHA standards as well as training.
- [Eye Wash Station](#) – a sink designed to push the water upward and is used for flushing out your eyes.
- [HAZMAT](#) – Hazardous Material plan for the handling, containment, and disposal hazardous materials.
- [MSDS](#) – Material Safety Data Sheets which provided by the manufacturer and provide all the necessary information needed to handle accidental exposure.
- [OSHA](#) – The Occupational Safety and Health Administration was created in 1970 as an agency of the Department of Labor.
- [Safety Glasses](#) – glasses that meet OSHA standards and protect the eyes from the sides as well as the front.

## FURTHER STUDY

The websites below are good reference websites.

- [OSHA](#) (Reference 2, OSHA, Public Domain)
- [NSC](#) (Reference 3, NSC, All Rights Reserved)
- [MSDS](#) (Reference 4, MSDS, All Rights Reserved)
- [Safety Resource](#) (Reference 5, Safety Resource, All Rights Reserved)
- [NFPA](#) (Reference 6, NFPA, All Rights Reserved)



## POST-TEST

1. OSHA is responsible for all work places in the US.
  - A. True
  - B. False
2. OSHA regulates issues such as minimum wage and overtime laws.
  - A. True
  - B. False
3. According to OSHA, \_\_\_\_\_ work related eye injuries occur daily.
  - A. 187
  - B. 592
  - C. 2000
  - D. 20000
4. Exposure to noise levels above \_\_\_\_\_ decibels are considered to harmful to employees.
  - A. 25
  - B. 75
  - C. 85
  - D. 105
5. Medical Style gloves offer protection against heat and UV radiation.
  - A. True
  - B. False
6. Hepatitis, HIV, and Staphylococcus are diseases that are transmitted through the air.
  - A. True
  - B. False
7. Mesothelioma is caused by exposure to \_\_\_\_\_.
  - A. Paints
  - B. Solvents
  - C. Asbestos
  - D. Excessive Noise
8. Which class of fire extinguishers are the most effective in a shop environment?
  - A. Class A
  - B. Class B
  - C. Class C
  - D. Class ABC

9. Respiratory protection is often overlooked because exposure usually results in immediate symptoms.
- A. True
  - B. False
10. What percentage of automotive injuries involves the eye or eyes?
- A. 2.8%
  - B. 7.8%
  - C. 10.1%
  - D. 25%
11. Thermal burns can be caused by which of the following items?
- A. Steam
  - B. Dust
  - C. Acids
  - D. Wind
12. Which of the following is an example of a blood-borne pathogen?
- A. Cancer
  - B. The Cold
  - C. Hepatitis C
  - D. Arthritis
13. What is the acronym for the federal agency that oversees workplace safety?
- A. NIMH
  - B. DOT
  - C. IRS
  - D. OSHA
14. Fire extinguishers should be operational, well-marked, and within 100 feet of a work area.
- A. True
  - B. False
15. Where would you find the correct treatment for an accidental exposure to a shop chemical?
- A. OSHA
  - B. Wikipedia
  - C. MSDS
  - D. On the Chemical Container
16. Shop fires can be successfully extinguished with which of the following.
- A. Fire extinguisher
  - B. Shop Air
  - C. Water
  - D. All of the Above

17. Hybrid vehicles with direct current DC systems do not pose any risk of death or electrocution.
- A. True
  - B. False
18. A rotating fan or belt is a hazard to which of the following?
- A. Long hair
  - B. Jewelry
  - C. Baggy clothes
  - D. All of the above
19. Cracked, damaged or worn tools should be:
- A. Used till broken
  - B. Replaced immediately
  - C. Used as another tool
  - D. Used less
20. Blunt force trauma to the eye and or eye socket should be treated by which of the following?
- A. Gently flushing the eye
  - B. Ice pack
  - C. Seeking emergency medical help
  - D. Rest
21. List three examples of how common sense can improve safety in the shop.
22. List three types of injury that can occur without proper eye protection.

**ASSESSMENT SOLUTIONS****ANSWERS TO ACTIVITIES****ACTIVITY 1**

This is an ungraded activity that allows the student to reflect in this topic in his or her own words. Answers may vary among students.

**ACTIVITY 2**

This is an ungraded activity that allows the student to reflect in this topic in his or her own words. Answers may vary among students.

**ACTIVITY 3**

This is an ungraded activity that allows the student to reflect in this topic in his or her own words. Answers may vary among students.

**ACTIVITY 4**

This is an ungraded activity that allows the student to reflect in this topic in his or her own words. Answers may vary among students.

**ACTIVITY 5**

1. Seek immediate medical attention (do not induce vomiting)
2. 115-140 degrees

**ACTIVITY 6**

This is an ungraded activity that allows the student to reflect in this topic in his or her own words. Answers may vary among students.

**ANSWERS TO ASSIGNMENTS****ASSIGNMENT 1**

Answers: A (top left image), B (top right image), C (bottom left image), K (bottom right image)

## ASSIGNMENT 2

Fire Extinguisher Class	Material on Fire
A	Wood
B	Motor oil
ABC	A vehicle
C	A shop wall
C	A piece of electrical shop equipment
B	Shop rags
B	Gasoline
A	Newspapers
B	Paint
C	Battery
C	Electrical panel
A	Trash can
K	Cooking oil
C	A computer
A	Plastic
D	Magnesium
ABC	Air compressor
ABC	Heater
Call 911 – Do Not Attempt to Suppress	The ceiling or roof

## ASSIGNMENT 3

Answers to this assignment will vary and should be assessed using the rubric provided below.

Criteria	Meets Expectations	Partially Meets Expectations	Does not meet expectations	Total points
Knowledge	Student has a clear understanding of the topic	Student exhibits some understanding of the topic	Student shows little to no understanding of the topic	



Criteria	Meets Expectations	Partially Meets Expectations	Does not meet expectations	Total points
	(40-30)	(29-16)	(15-0)	
<b>Analysis</b>	Student offers a concise rationale for their choices (40-30)	Student offers some rationale for their choices (29-16)	Student shows little to no rationale for their choices (15-0)	
<b>Spelling and Grammar</b>	Sentences are coherent; grammar/spelling errors are absent or rare (20-15)	Most sentences are coherent; few grammar/spelling errors (14-6)	Sentences are incoherent; numerous grammar/spelling errors (5-0)	
<b>Comments:</b>			<b>Total Points:</b>	

#### ASSIGNMENT 4 - DISCUSSION ASSIGNMENT

Discuss your floor plan layout in Assignment 3. Compare and contrast the designs of your fellow students. Use your critical thinking skills to assist your classmates and submit a final plan that your class or group agrees is the best final layout.

Answers will vary. Use the following rubric

Criteria	Meets Expectations	Does not meet expectations	Total points
<b>Comparison</b>	Students compare floor plans and identify common solutions (40 – 20)	Students compare floor plans and do not identify common solutions or do not compare floor plans (19 – 0)	

Criteria	Meets Expectations	Does not meet expectations	Total points
<b>Contrast</b>	Students contrast floor plans and identify common solutions (40 – 20)	Students contrast floor plans and do not identify common solutions or do not compare floor plans (19 – 0)	
<b>Group Work</b>	Everyone in group works together in a team and not as individuals (20 – 10)	Everyone in group does not work together in a team and final solution is as individuals (9 – 0)	
<b>Total Points:</b>			



ANSWERS TO PRETEST

- |      |       |
|------|-------|
| 1. D | 6. B  |
| 2. B | 7. A  |
| 3. C | 8. D  |
| 4. B | 9. B  |
| 5. C | 10. A |



ANSWERS TO THE POST TEST

1. B
2. B

3. C
4. C
5. B
6. B
7. C
8. D
9. B
10. B
11. A
12. C
13. D
14. B
15. C
16. A
17. B
18. D
19. B
20. C
21. Answers will vary
22. Trauma, Chemical Burns, and Thermal Burns

**TRANSCRIPTIONS AND EMBED CODES****VIDEO 1 – INTRODUCTION – TRANSCRIPT**

This module is designed to inform you of potential health and safety hazards that you could encounter in the automotive repair industry. Shop safety is critical in this industry in order to protect consumers, businesses, and employees. This module is about raising awareness and looking at some hazard prevention. Let's get started!

**VIDEO 1- INTRODUCTION – EMBED CODE**

```
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```

**VIDEO 2 – EYE WASH – TRANSCRIPT**

Eye wash stations are specially engineered sinks designed to wash contaminations and irritants that enter the eye.

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### VIDEO 3 – EYE PROTECTION - TRANSCRIPT

A standard pair of safety glasses offers great protection most times in the shop. But at times during - times of welding and grinding a supplemental face shield is required to fully protect the eyes and face.

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### VIDEO 4 – EYE PROTECTION TRANSCRIPT

[The Washington State Department of Labor & Industries Presents: September 2005  
Logo of Washing State DOL]

[Protect Your Eye site]

Hi my name is Ron Langley, I'm with the Labor and Industries here in Washington State. I'm sitting here in the Tacoma Dome, the world's largest freestanding wooden structure, to help you visualize what might otherwise be a dry statistic.

According to the US Department of Labor, enough people in the United States suffer eye injuries at work each and every month of the year to fill this entire arena passed its seating capacity. [30,500 eye injuries each month] And if that's a depressing statistic, here's a related one. Ninety percent of those injuries [28,350 injuries easily preventable!] would have been prevented just by the use a proper eye wear.

There are dozens of things in every workplace that pose hazards to our eyes, those most fragile exposed parts of our bodies. Sparks, chemicals, flying particles and a significant number of trips to the emergency room every year are caused by splinters in the eye. The effect of those hazards can be demonstrated by a common tool and one that's a common source of injuries, the staple gun. [Sound of the staple gun firing] An injury like that [staple embedded in eye] would probably have been prevented just by wearing ordinary glasses.

However ordinary eyeglasses aren't really an effective for my protection as this person discovered while operating a powered lawn edger. [Screw through lens of glasses] Nail guns, for example, are causing more and more workplace injuries with every passing year. Regular eyeglasses simply aren't designed to protect eyes from sharp high-impact objects. [x-ray of skull with a name through the eye and extending deep into the skull]

To demonstrate we put a pair of regular eyeglasses on our friend Yourit. [manikin wearing glasses and hat] [Hear a nail gun fire; nail goes through glasses; eye severely bleeding] Not only did the glasses, fail to protect his eyes, the lenses themselves created their own hazard when they shattered. [shattered lens] It's also common to see people depending on sunglasses for eye protection.[manikin with sunglasses – nail gun firing – eye bleeding – broken lens] Again not only inadequate as protection, but adding to the hazard when he hit with an object. And even some of those things we think are safety glasses, don't protect our eyes like they should. [manikin with glasses that look like safety glasses – nail gun firing – eye bleeding – broken lens] A pretty high price to pay for some company's decision to sell shoddy imitations.

To put it simply, if they don't have the A-N-S-I, ANSI, ANSIZ 87 stamp on them, don't gamble your precious eyesight on them. [mark located on the legs of the glasses] Sometimes you have to look closely to see it, but it's worth your effort to find the stamp. It's all so important to note that these have side shields, [glasses] many injuries to people were in regular classes came from the side.

So let's see how well ANSI rated safety glasses hold up to a nail gun. [Manikin with ANSI glasses on] Note off to the right, the muzzle at the nail gun. It's in point-blank range.[gun fires] Quite an impact, but not an eye injury. [glasses do not break] and with a different pair of ANSI rated glasses [manikin with ANSI glasses on – nail gun fires from front]See that dimple [in glasses]. What a difference from regular glasses or from the so-called safety glasses that weren't ANSI rated. And a third pair of ANSI rated glasses [manikin with ANSI glasses on – nail gun fires from front] and the third success; it's pretty impressive! But what's even more impressive? Some of these glasses cost less than seven bucks, not much more than most of us find in the cushions have our living room furniture.

Seems like a pretty simple choice, doesn't it? Seven bucks for something that will protect our eyes from a sixteen penny nail fired at close range. Compare that to others: regular glasses won't protect you, neither will sunglasses, or the fake safety glasses that only give you a false sense of protection. It really is an easy choice when you know what to look for.

But I was curious, just how good are the safety glasses? So I asked John Crosman, shooting coach instructor with the National Rifle Association, to help me out. [coach shoots rifle – hits Yourit in glasses] Ouch! That was quite an impact and poor Yourit. At

first it didn't look like the bullet went through the glasses, but what happened was the lens material closed back up as soon as the bullet went through it.

The important lesson of course, is that a pair safety glasses by themselves won't protect against all the hazards in the workplace. It's important to choose the right kind of my protection. Handling chemicals, using a grinder or lathe, welding, you want more appropriate eye protection. [manikin with eye shield on] But for the majority of workplace situations, just a simple pair of ANSI approved safety glasses, will keep your very precious and very vulnerable eyesight protected. And it's important to remember that there is no substitute for practicing safety at all times.

Let me return to that statistic [28,350 injuries easily preventable!] ninety percent of workplace eye injurie would have been prevented simply by wearing proper eye protection. That would have been empty all the seats in the Tacoma Dome and still left 2000 to 3,000 more the seats over here [side of dome – [www.lni.wa.gov](http://www.lni.wa.gov)] Again, each and every month of the year. But it's worth asking, would we still have that many eye injuries, if just by the act of putting on eye protection people were more aware of eye hazards and unsafe practices where they work? Then, maybe, we could month after month, keep the seats just as empty as they are now. Because eye injuries are about more than some temporary pain, medical bills, and some days off from work; they're about people losing part or all of their ability to enjoy the beauty we're surrounded by and often take for granted every day. It's about being unable to fully enjoy those things that used to make our lives so enjoyable. [www.lni.wa.gov Washington state logo] [narrator Ron Langley]

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#### VIDEO 5 – UNIFORM – TRANSCRIPT

A properly worn uniform is tight fitting, includes a belt, safety glasses, and protective gloves. This offers a fair amount of safety from moving parts and hazards in the shop.

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#### VIDEO 6 – SKIN PROTECTION – TRANSCRIPT

The most overlooked area of personal protection is skin protection. It's critical that skin protection is used when using solvent tanks to wash parts or when using hot water style tanks or hot water washers to wash parts.

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## VIDEO 7 – EAR PROTECTION – TRANSCRIPT

Disposable ear plugs and noise cancelling headphones are popular choices for ear protection in the automotive industry.

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## VIDEO 8 RESPIRATOR TYPES #SAFETY #RESPIRATOR #OSHA – TRANSCRIPT

[Respirator types] This is a video about the different types of respirators that workers might use in their workplace. If your employer requires you to wear a respirator on the job, the Federal Occupational Safety and Health Administration also called OSHA and state OSHA agencies require that your employer select an appropriate respirator for you. A brief overview in general information about various types of respirators and some of your employer's responsibilities under OSHA respiratory protection standard will be discussed in this video. This video can be part of the OSHA required respiratory protection training which includes many topics, like how to put on and take off a respirator, and how to use, clean, and maintain your respirator. Your employer must also provide you with work site-specific training.

There are two main types of respirators: air purifying respirators which use filters cartridges or canisters to remove contaminants from the air you breathe, and atmosphere supplying respirators which provides you with clean air from an uncontaminated source. Respirators can also be classified as tight-fitting or loose fitting. Tight-fitting respirators need a tight seal between the respirator and the face and or neck of the respirator user, in order to work properly. If the respirator seal leaks, contaminated air can be pulled into the face piece and can be breathed in. Therefore anything that interferes with the respirator seal is not permitted when using this type of a respirator. This could include facial hair, earrings, head scarves, wigs, and facial piercings.

If you are required to use it tight-fitting respirator at work, you must be fit tested with the respirator selected for your use. Fit testing is done to be sure that the respirators face piece fits your face. You must be fit-tested before you use a respirator for the first time. You must also be retested at least every twelve months to be sure that your respirator continues to fit your face.



A fit test should not be confused with the user seal check. A seal check is a quick check performed by the wearer each time the respirator is put on. It determines that the respirator is properly seated to the face or needs to be readjusted. Loose fitting respirators do not depend on the tight seal with a face to provide protection. Therefore, they do not need to be fit tested.

Your employer is responsible for selecting appropriate respirators to protect you from airborne hazards. To ensure that the correct respirator is selected, your employer must consider a number of factors. First, your employer must identify and evaluate the hazard. Your respirator will need different types of filters, cartridges or canisters depending on the amount of airborne contaminant in your workplace. It is your employer's responsibility to determine which filter, cartridge, or canister is necessary and how often it needs to be changed. For example: respirators that have particulate filters will not protect you against gases, vapors, and non-particulate components of fumes, mists, fogs, smoke, and sprays. Your employer must also determine if the work atmosphere lacks sufficient oxygen. That is, if it is oxygen deficient or is contaminated to the point of being immediately dangerous to life or health. This is also referred to as an IDLH. Only atmosphere-supplying respirators such as an airline respirator or a self-contained breathing apparatus also known as an SCBA can be used in IDLH atmospheres. Once your employer has identified the type and amount of airborne contaminant present in your workplace, your employer will use this information to see how much protection you need the respirator to provide to you.

Different types of respirators offer different levels of protection. The measure of a respirator's protection capability is called the assigned protection factor or APF. This is a number that OSHA has assigned for each class of respirators. It represents the level of protection from airborne exposure each class of respirators is expected to provide. The larger the number, the greater the level of protection. For example: when used properly a respirator with an APF of 10 will reduce your exposure to one-tenth the concentration of the contaminant in the air. Similarly, a respirator with an APF of 50 will reduce your exposure to one-fiftieth of the concentration of the contaminant in the air. OSHA's APF can be found in table one of its respiratory protection standard. When selecting an appropriate respirator your employer must also consider whether the hazard has any additional characteristics that may affect the type of respirators selected. For example: does the hazard irritate the eyes? Do you need splash and

spray protection as well as eye protection? If so you will need of full face piece respirator or some type of eye protection.

Let's take a closer look at the different types of respirators that are available to protect you. There are advantages and disadvantages to each type of respirator, so it's important that your employer select the type that's best suited for your work setting and the hazards you face.

These are filtering face piece half mask respirators, sometimes referred to as N95's. A filtering face piece respirator covers the nose and mouth and as a tight-fitting air purifying respirator in which the whole piece functions as the filter. Filtering face pieces may or may not have an exhalation valve to help exhaled breath exit the face piece. They need to be fit-tested unless you are wearing them under voluntary use conditions.

Filtering face piece respirators filter out particles and do not protect against non-particulate hazards such as gases or vapors.

This is a half face piece elastomeric respirator. It is a tight-fitting air purifying respirator with replaceable filters for particulates or cartridges or canisters for gases and vapors. In either case, these are attached to a rubber or silicon face piece that covers the nose and mouth. This type of respirator needs to be fit-tested and can be used instead of a filtering face piece respirator. An elastomeric half face piece respirator can be cleaned, decontaminated and reused. This is not the case for a filtering face piece respirator which is normally discarded after use.

Like filtering face pieces, half face piece elastomeric respirators can be used for particulate, they can also be used for many gases and vapors if equipped with the proper cartridges.

This is a full face piece elastomeric respirator. This type of respirator provides a higher level of protection than a half face piece respirator because it has better sealing characteristics. Since it covers the user's eyes and face, it can also be used to protect against liquid splashes and irritating vapors. Like the half mask elastomeric respirator, this respirator is a tight-fitting air purifying respirator, with replaceable filters or cartridges attached to a rubber or silicone face piece. It needs to be fit tested.

This is a loose fitting face piece powered air purifying respirator or PAPR. PAPR has a blower pulls air through attached filters. The blower pushes the filtered air into the face piece which covers all of the user face. Since it is loose fitting, it does not need to be fit tested and can be used by workers with facial hair. Another type of PAPR is that tight-fitting full face piece PAPR. This PAPR has an elastomeric face piece made of rubber or silicone. It has filters and a blower that operate as they do loose fitting face piece PAPR. Because this PAPR for has a tight-fitting face piece it must be fit tested.

There are also half-mask PAPRs as well as PAPRs that have a helmet or hood. This is an airline respirator. It supplies clean breathing air to either through hood or a face piece through a long hose from a source of clean air such as a cylinder or compressor. If the face pieces tight-fitting, it must be fit tested.

This is a self-contained breathing apparatus or SCBA. It is a type of atmosphere supplying respirator. SCBAs have a tight-fitting elastomeric face piece that covers the users face. The air supplied from a cylinder of compressed breathing air is designed to be carried by the respirator user. The face piece is tight-fitting and must be fit tested. As its name implies, this respirator is truly self-contained. These respirators provide the highest level of respiratory protection.

You may hear someone referred to a respirator as a N95 or P100. While most people use the term and N95 to refer to filtering face piece respirators and ninety-five actually describes the type of filter material and its protective properties. The filter material can be used in either of filtering face piece respirator or in a filter cartridge that's attached to an elastomeric respirator. The first part of the filters classification uses the letters N, R or P to indicate the filters ability to function when exposed to oils. N means not resistant to oil; R means somewhat resistant to oils; and P means strongly resistant to oil or oil proof. This rating is only important in work settings were oils may be present because some oils can reduce the effectiveness of the filter. The second part of the classification, the number, refers to the filters ability to remove the most penetrating particle size during worst-case testing. Filters that remove it least ninety five percent of these particles are given and ninety-five rating. Those that filter out at least ninety nine percent receive ninety-nine reading and those that filter out at least 99.97 percent, essentially one hundred percent, received a one hundred rating. Using this classification method, an N95 filter is not oil resistant and removes at least ninety five percent of the most penetrating particles.

If you use a PAPR, the high-efficiency particulate air filter, or HEPA filter that is attached to your unit it's similar to a P100 filter. The National Institute for Occupational Safety and Health or NIOSH tests different respirator models in its laboratory to make sure they meet certain minimum performance standards. To become NIOSH certified respirators must pass the performance tests listed in NIOSH's regulations. For example: NIOSH test the filter efficiency of the filter materials used in a respirator.

When respiratory protection is required employers must provide NIOSH certified respirators to their workers. To see if your respirator is NIOSH certified look for the NIOSH logo as well as the test and certification approval number or T\_C\_ number. The logo and T\_C\_ number can be found on the respirators package or the user instruction insert and sometimes they appear directly on a respirator's components such as the respirator filter or cartridge. If your respirator is not NIOSH certified do not use it in a hazardous area.

You must never alter your respirator. Doing so can reduce its protective quality and expose you to the airborne hazard. Never glue or staple things to your respirator. Do not write on your respirator's filter material and never put holes in your respirator. However it is ok to write your name on your respirator's straps. You must never use unapproved parts on your respirator.

This video has provided you with a brief overview of the types of respirators available and how they are selected to protect you against airborne workplace hazards. There are many other things that you must know and do before you can safely use a respirator in a hazardous work environment. While this video may be part of your respiratory protection training, your employer must also provide you with additional training on respirators including work site-specific training. Remember if you don't know if a respirator is needed for the task you will be doing or if you are unsure about how to properly use a respirator or which filter or cartridge to use, talk to your supervisor before entering the hazardous area.

For more information about the respirator used at your workplace, refer to these OSHA and NIOSH websites. [[www.osha.gov/respirators](http://www.osha.gov/respirators) [www.cdc.gov/niosh/topics/respirators](http://www.cdc.gov/niosh/topics/respirators)] you'll find OSHA's respiratory protection standard, additional respirator training videos and other guidance material to help you work safely.

Mention or visual display of the name of any company, organization, or product in this video does not constitute endorsement by the Occupational Safety and Health Administration (OSHA). This video provides a brief overview and general information regarding respirator use in your workplace. It does not cover all of the requirements specified by OSHA's Respiratory Protection Standard at 29 CFR 1910.134, and is not to be the sole means of fulfilling an employer's compliance purposes. Consult the Respiratory Protection Standard for a complete list of requirements regarding respirator use in your workplace.

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#### VIDEO 9 – ELECTRICAL SAFETY – TRANSCRIPT

In the event of an electrical fire, it's very important that you reach the panel labelled "Emergency Disconnect", open the door [opens door], find the switch, and turn the emergency disconnect switch to the off position. [Demonstrates pulling switch down and closed door of panel]

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#### VIDEO 10 – EQUIPMENT SAFETY – TRANSCRIPT

Before using shop equipment, assess the equipment. Make sure that guards, visors, and safety mechanisms are attached and working properly. Be sure that any supplemental protection devices such as face shields are used and available. And be aware of any kind of emergency disconnect switches that may be there in the event of an emergency.

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#### VIDEO 11 – AUTOMOTIVE LIFT SAFETY AWARENESS – TRANSCRIPT

[Autoliftsafety.com Automotive Lift Safety Awareness]

Using an automotive lift is a common task the trained automotive lift technicians perform numerous times every day. However it's a critical task and should be done in a safe manner employing the proper procedures. There are many hazards to be avoided to reduce the risk of damage to customer vehicles and injury or death the technicians.

This videos is an aid to point out some of the dangers involved and the proper procedures required operate an automotive lift safely.

[Before you lift any vehicle – sound of an air ratchet twice] There are right ways to lift a vehicle and wrong ways. Before you lift any vehicle make sure that you are properly trained in the operation of automotive lifts. It has the potential to be dangerous work and training is a must. Always read the operator's manual provided by the manufacturer of the lift. It's important that the operator be familiar with the safety features, maintenance, inspection, and operation of each lift before use.

[Inspections & Maintenance – sound of an air ratchet twice] Check that your lift has been safely inspected by a qualified lift servicemen within the past year .Most automotive lift service companies affix a decal to the lift that states when the next inspection is due. Besides the all-important annual inspection, perform the periodic inspection and maintenance as stated by the manufacturer yourself. Put your safety in your hands. For example, make a daily the examination of the cables and chains for wear and insure the safety latches are engaging and disengaging fully.

If you're using a twin post lift, check the operation of the arm restraints and make sure they disengage and engage fully. Once a month, torque anchors to manufacture specs. Check the hydraulic fluid. Check the torque curve all fasteners. Check that the lift is equalize properly. On a twin post lift, the locks should click simultaneously. Check hoses for cracks or chafing and check the condition of the superstructure.

[Preparing to Lift a Vehicle – sound of an air ratchet twice]

Only a trained operator who has performed to the manufacturer's recommended maintenance and inspection on a lift that has been inspected by a lift service specialist is ready to lift the vehicle.

First check that the vehicle you are about to lift does not exceed the maximum capacity above the lift. Look inside the vehicle, check for unexpected loads. Never live to vehicle that has a heavy load inside. Then check that the bay is clean and tidy. Clean up any oil spills tools and debris. If you're using a twin post lift make sure that the lifts arms are located in the home position. Have your spotter stand at the front but to the side of the vehicle to avoid being hit in the event of an accident. Drive the vehicle into the lifting area. If you're working on a twin post lift, it is very important to know the vehicle manufacturer's recommended lifting points. They can be found in the shop manual for

the vehicle or can be obtained by the Automotive Lift Institute. When using a twin post lift the vehicles center of gravity or its balancing point is a great consideration. Typically the center of gravity on a front wheel drive car is located under the steering wheel, yet on a rear wheel drive vehicle its center of gravity is located under the front seat. However this is not the rule for vehicles with engines in the rear. The center of gravity is a great cause for concern in using a twin post lift and has to be spotted midway between the front and rear arms. On four-poster hoist it's important to choc the front and back over at least one wheel.

[Lifting A Vehicle – sound of an air ratchet twice]

With the vehicle in position you are now ready to lift. Activate the lifts ascend controls. The lifts controls are hold to run style or momentary which means the action should stop when you let go of the button or valve. On a twin post hoist raise the lift so that the pads are one inch from the vehicles lifting points. Check the lifting points. If they're aligned, raise to lift until the vehicle is one foot from the ground, recheck the lifting points. If they remain aligned, go to the rear of the vehicle and shake it moderately, recheck to lifting points. If all is good raise to lift to the desired working height. Never look away from a vehicle in motion. Always be aware and constantly survey the lifting vehicle. Listen for the locking latches. When you achieve your correct lift height you must now lower the lift onto the safety latches. Then and only then can you proceed to work under a vehicle.

If your work includes any heavy lifting, prying, pulling, or you're going to remove a large component, you must use for appropriately rated jack stands. Always raise the height of the stands to the vehicle and never lower the vehicle to the stands. Whether your job is finished or you need to do a job at a lower height, when lowering the lifts, be sure to remove your stands, tools, transmission jacks, oil caddies, and cleanup any oil spills. It's good practice to announce to your colleagues in the next bays that your lift is descending. Raise the lift slightly and disengage the lifts locks. It's important to walk the perimeter of the vehicle if your lift has a dual point lock release. Remember don't walk under the vehicle with the safety latches disengaged. Lower the vehicle. Return arms to the home position and drive out of the bay knowing the job was safely done.

[Always put safety First – sound of an air ratchet twice]

Never lift a vehicle with a passenger inside. Never allow customers into your bay area. Never tried to support a fallen vehicle, clear the area and announce the danger to others. Never use a damaged lift. Never use less than four arms on a twin post lift to lift a vehicle. Never jury rigged the momentary controls or locking latches. Never use homemade adaptors, blocks of wood or bricks are not lift accessories. Never repair a lift yourself. In fact Tag-out to lift that you suspect there's a problem and do not use it until it has been looked at by a qualified factory-trained lift specialist.

Remember, lifting a vehicle is a critical task and has the potential if danger. It should only be performed by a train operator who uses care, consideration, and proper procedures associated with automotive lift safety.

Be cautious and lift safe. [autoliftsafety.com]

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#### VIDEO 12 – SHOP SAFETY – TRANSCRIPT

Shop safety begins by assessing environment. I'm doing a 360 turn [camera pans a full circle] through the shop, looking around, looking for particular safety items. Focus mainly on fire extinguishers, eye wash stations, emergency egress doors, equipment, equipment placement, power disconnect boxes, tool storage, sinks, and all general purpose areas. Make a plan; understand which way you have to go and what you need to do in case of an emergency.

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#### VIDEO 13 – FIRE EXTINGUISHERS – TRANSCRIPT

Contact In the event of a fire, grab the fire extinguisher [removes it from wall] pull the safety pin, [pulls pin], remove hose, [unclips hose from side of canister], squeeze handle. Red dot

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#### VIDEO 14 – FIRE EXTINGUISHERS - TRANSCRIPT

A fire extinguisher is a portable device used to eliminate or control fires in emergency situations. Fire extinguishers are considered active devices because a properly serviced fire extinguisher is ready to use anytime on demand. A fire extinguisher consists of a cylinder with a gauge, control handle, and a direct hose. The cylinder comes filled with a fire extinguishing agent with ingredients determined by the fire



classification. Portable fire extinguishers come in various sizes from one to thirty pounds. Commonly shops will be equipped with fire extinguishers ranging from ten to thirty pounds with a sixteen pound being the most common.

#### VIDEO 14 – FIRE EXTINGUISHERS – EMBED CODE

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#### VIDEO 15 – FLAMMABLE MATERIAL STORAGE – TRANSCRIPT

Flammable items such as gasoline, paint thinner, paint, solvents, and aerosol cans should be stored in a properly labelled, colored, and lockable flammable container similar to the one illustrated here in this video [yellow flammable proof container]

#### VIDEO 16 – FIRE EXTINGUISHER TRAINING VIDEO – TRANSCRIPT

[Over 400 people die each year from fire]

[Over 25,000 people are injured each year from fire]

Fire is a deadly destructive force. Fire-related property loss last year alone was estimated at \$11 billion dollars. The best way for the average person to be safe from fire is to prevent it from happening in the first place. However certain situations a fire extinguisher can help you limit the damage a fire might cause by putting it out before it has a chance to grow out of control.

[Fire extinguishers are your first defense against fire.]

Fire extinguishers are your first defense against fire. Before we talk in detail about fire extinguishers, let's talk about fire itself. You can think a fire is a three-part chemical reaction. [Three part Chemical Reaction] or triangle. The base of the triangle is fuel. Fires need some material to burn. one-sided the triangles heat. All fires are hot. The other side of the triangle is oxygen; without oxygen fire goes out.

Fire extinguishers put fires out by taking one of the three parts out of the mix and interrupting the chemical reaction. Fire is very fast. In nearly thirty seconds a small fire can grow completely out of control, engulf a room. Room temperature in a fire can be a hundred degrees at the floor, and up to 600 degrees at eye level. The best way to survive the fire is to have working smoke alarms and a quick safe escape route. Knowing when and how to use a fire extinguisher is a matter of life and death. If you choose the wrong extinguisher, or use it in the wrong circumstances you could make a small fire worse, and you could be injured or even killed.

[classes of fire]

No two fires are just alike. Fires burn, spread and are extinguished depending on what is burning. Fires are separated into classes depending on what is burning and fire extinguishers are designed to put out only a certain class or classes of fire. The classes of fire are A, B, C, D, and K. [Classes of Fires: A, B, C, D, & K]

Class A fires are those materials like wood, paper, trash, cloth, and other ordinary combustibles. [Class A Fires: Ordinary Combustibles, wood, paper, trash, cloth, etc.] These fires can be extinguished by either air pressured water or dry chemical extinguisher. Class A extinguishers are labeled with the letter A inside a triangle and/or a picture of burning trash.

Class B Fires are fires of flammable liquids like oil, grease, gasoline, kerosene, or acetone.[Class B Fires: Flammable Liquids, oil, grease, gasoline, kerosene, acetone,

etc.] Using water on the Class B fire can spread the fire to a larger area [Do not use water on a Class B fire] causing more damage or even injury. Class B fires can be extinguished by either dry chemical extinguishers or carbon dioxide extinguishers. Class B extinguishers are labeled with the letter B inside a square and/or a picture a burning gas can.

Class C is the category for electrical fires, such as those in appliances [Class C Fires: Electrical equipment, energized electrical appliances, equipment, and outlets] and electrical outlets. These fires could be extinguished by either dry chemical extinguishers or carbon dioxide extinguishers. Class C extinguishers are labeled with the letter C inside a circle and/or a picture of a burning electrical plug.

Most homes are best protected by multi-purpose fire extinguishers [Multipurpose Fire Extinguishers] These extinguishers are called dry chemical extinguishers. Dry chemical extinguishers work by separating the fuel element of the fire from its oxygen supply. The agent inside the extinguisher coats the fuel with a thin layer of dust. it not only separates the fuel from the oxygen in the air but also it interrupts the chemical reaction of fire. [Interrupts Chemical Reaction] Multi-purpose dry chemical extinguishers are also called ABC extinguishers because they put out class A, B, and C fires. These extinguishers are safe for use on ordinary combustible fires like furniture or papers, on fires a flammable liquids like grease, or nail polish remover, [A, B, C, Fires: Ordinary Combustibles, Flammable liquids, and on fires in electrical equipment. They are labeled with the A, B and C emblems and/or the pictures associated with each type.

In addition to the letter and pictures symbols, fire extinguisher labels have numbers on them to tell the size of the fire the extinguisher can handle. The number with the letter A tells how much water or other extinguishing agent it holds. The number with the letter B tells approximately how many square feet of flammable liquid the fire extinguisher will put out. The larger these two numbers are, the larger the fires they can be expected to put out. [The larger the number the larger the fire] There is no number associated with the letter C on a label.

The fourth class a fire is Class D. These fires are those in combustible metals such as magnesium, titanium, potassium, sodium, and others. Class D extinguishers are necessary in laboratories and industrial areas where these metals are found. The metals burned at extremely high temperatures and react violently with water, air, and certain chemicals. Class D extinguishers are labeled with the letter D inside a star.

Class K fires are fires in restaurant kitchens. In recent years the restaurant industry has begun to use vegetable oils and their deep fat fryers. Class K extinguishers were developed to deal with these hotter oil fires in restaurants settings.

It's important to understand the classes of fires for two reasons. First to make certain you purchase the type extinguisher you're most likely to need and second to make certain before you try to put out a fire that you have the right fire extinguisher at hand. If you do not know for sure what is burning, do not even try to extinguish a fire. Exit immediately and call the fire department from a neighboring home or business. Fire extinguishers are great tools for limiting the damage a fire can do if they are used under the right conditions.

If you think you can fight a fire safely go ahead and give the extinguisher a try. Here's what has to happen: First call the fire department at 911 or tell someone else to do it. If you're at work, pull the fire alarm too. Only try to fight a fire that is small and contained. If the fire is spreading, leave the area immediately. Also try to use the extinguisher that is easy to reach and in working order; that is it is fully charged. Also make sure the extinguisher is large enough to put out the fire within 8 to 10 seconds. That's how long you'll have because most extinguishers completely discharge their extinguishing agent in under 10 seconds. [8 to 10 seconds]

Most portable fire extinguishers are fairly straightforward to operate, but if you don't know how to use the extinguisher you have, the time of the fire is not the time to learn. Only attempt to use the extinguisher you're familiar with. Don't start fighting the fire until everyone else has left the area or is leaving. Before you try to fight a fire, position yourself between the fire and an easy to reach exit. The exit should be at your back as you face the fire. Don't hesitate to quit if conditions change. If smoke fills the room: drop the extinguisher, get on your hands and knees, cover your nose and mouth with your shirt, and crawl to the exit. The indispensable key to fighting fires safely is, knowing how to use the extinguisher. If you're not very comfortable with operating instructions, don't even try to use the extinguisher. Different extinguishers have slightly different operations but they are similar.

Here are a few simple steps that apply to most extinguishers. Just remember PASS. [PASS] PASS is a memory device for the four basic steps a fire extinguisher use. [P Pull the pin] P Pull the pin. A pin or latch locks the operating lever. Pull the pin or latch to free the lever. Stand 6 to 8 feet away from the fire. [A aim at the base of fire] A aim

extinguishers nozzle or hose lock at the base of the fire. S. Squeeze the lever that operates the extinguisher. [Squeeze the Lever] The extinguishing agent will immediately begin to discharge. S. Sweep from side to side. [Sweep from side to side] The fire seems to be going out; move carefully toward it as you continue sweeps side to side. Even after the fire appears to be out, keep an eye on the site until the fire department arrives. Firefighters should examine the site of any fire, to be certain that it is completely out.

#### [Fire Extinguishers at Home]

At home you should have a fire extinguisher in the kitchen, the basement, the garage, and in the workshop. Also it's a good idea to have one near the bedrooms, and in the living room especially if any smokers live in the home, or if you use wood stoves or space heaters for heat. In your home, install fire extinguishers three to five feet off the ground, where adults can easily see, and can reach them. Teach kids that extinguishers are not toys and are not to be touched. If you use a bracket to hang your extinguisher, make sure the bracket is easy to open. A stable shelf or alcove is a good location. Never hide your extinguishers in the closet or cupboard. Store all extinguishers away from heat sources. Install extinguishers near the exits, in between any likely source a fire and the exit.

If you work in an office or other low fire risks setting, fire extinguishers are installed much as they are at home. They should be placed in kitchens, near machinery, and in hallways. In most communities, workplace fire extinguishers are subject to regulation. Your local fire department will be happy to assist you in selecting and installing fire extinguishers in your workplace. Fire extinguishers are generally easy to maintain. Make sure any moving parts are dust and corrosion free [Check]. Check extinguishers monthly to see that they are charged in full. [Check extinguishers monthly] Most ABC extinguishers are disposable, and must be discarded after use. If their gauges show empty, they must be replaced. Rechargeable units must be recharged, if their gauges indicate low charge.

Most of us hope that if we found a fire burning, we could save the day by putting it out, but putting out a fire is not as simple as it seems. Fire's a major killer. It's hotter, faster, and more uncontrollable many people think. At the same time a knowledgeable adult, with the working fire extinguisher, can put out some small containable fires. In the case of a fire, evacuate the building, call the fire department or have someone else call from

a neighboring house or business, and then assess whether a small blaze can be put out with a fire extinguisher. Preparation and knowledge can make fire extinguishers your first defense against fires. [Fire Extinguisher: Your First Defense Against Fires]

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#### VIDEO 17 – HAZMAT – TRANSCRIPT

A waste fluid storage area, such as this [waste tanks in a corner of shop], must be properly labelled, identified, and must be kept clean of spills and debris.

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#### VIDEO 18 – MSDS – TRANSCRIPT

In the MSDS is a binder of book containing information about the effects of exposure to hazardous materials that may be present in a shop. Books like this [MSDS book] are found regularly in shops, hanging in close proximity to the technicians. Technology has also allowed MSDS's to be made online [shows computer site for MSDS] for fast, easy, online searching.

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#### VIDEO 19 – COMMON SHOP SENSE – TRANSCRIPT

This welder is an example of common sense safety. As you can the protective welding gloves and welding mask are stored with the welder. By doing this, there's very little chance the welder will be used unsafely without one of the two protective items.

## ATTRIBUTION TABLE

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Figure 2	Oxfordian June 1, 2012	Puma on the Tube	<a href="https://www.flickr.com/photos/oxfordian/7310989654/in/photolist-3cJ8i5-s4gNhu-c93JvL-iEu74C-">https://www.flickr.com/photos/oxfordian/7310989654/in/photolist-3cJ8i5-s4gNhu-c93JvL-iEu74C-</a>	Creative Commons Attribution – NoDerivs – 2.0 Generic (CC BY – ND – 2.0)

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Video 8	James Parks March 21, 2003	RESPIRATOR TYPES #safety #respirator #OSHA	<a href="https://www.youtube.com/watch?v=wf64hl7WYJ8">https://www.youtube.com/watch?v=wf64hl7WYJ8</a>	Standard YouTube License
Figure 9	El cajon yacht club August 17, 2003	THOR's hammer and framing square DSC_0544	<a href="https://www.flickr.com/photos/el_cajon_yacht_club/9530113595/in/photolist-fw9jKn-4NTqUr-4StkSQ-">https://www.flickr.com/photos/el_cajon_yacht_club/9530113595/in/photolist-fw9jKn-4NTqUr-4StkSQ-</a>	Creative Commons Attribution – Generic 2.0 (CC BY – 2.0)

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Video 12	York Technical College	Shop Safety	<a href="https://youtu.be/sKjraQcC5x0">https://youtu.be/sKjraQcC5x0</a>	Creative Commons Attribution (CC BY)
Video 13	York Technical College	Fire Extinguishers	<a href="https://youtu.be/o3Hj1bWeJ1c">https://youtu.be/o3Hj1bWeJ1c</a>	Creative Commons Attribution (CC BY)
Video 14	York Technical College	Fire Extinguishers	<a href="http://www.voki.com/pickup.php?scid=11624196&amp;height=267&amp;width=200">http://www.voki.com/pickup.php?scid=11624196&amp;height=267&amp;width=200</a>	Public Domain
Video 15	York Technical College	Flammable Material Storage	<a href="https://youtu.be/lh4lZB4jo00">https://youtu.be/lh4lZB4jo00</a>	Creative Commons Attribution (CC BY)
Video 16	JCFD3	Fire Extinguisher Training Video	<a href="https://www.youtube.com/watch?v=QK5dMp43NJE">https://www.youtube.com/watch?v=QK5dMp43NJE</a>	Standard YouTube License
Figure 10	Jonathon Stewart December 8, 2014	Fire Extinguishers	<a href="https://www.flickr.com/photos/125390477@N05/15792507868/in/dateposted/">https://www.flickr.com/photos/125390477@N05/15792507868/in/dateposted/</a>	Creative Commons Attribution – NonCommercial – NoDerivs – 2.0 Generic (CC BY – NC – ND – 2.0)
Figure 11	Jeffrey Clade April 30, 2015	Trash can on fire and campfire	<a href="https://www.flickr.com/photos/132845931@N04/17133369248/in/">https://www.flickr.com/photos/132845931@N04/17133369248/in/</a>	Creative Commons Attribution – NonCommercial –

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			<a href="#"><u>dateposted/</u></a>	NoDerivs – 2.0 Generic (CC BY – NC – ND – 2.0)
Figure 12	Jeffrey Clade April 30, 2015	Gas can pouring fluid on flames	<a href="https://www.flickr.com/photos/132845931@N04/17134927919/in/dateposted/"><u>https://www.flickr.com/photos/132845931@N04/17134927919/in/dateposted/</u></a>	Creative Commons Attribution – NonCommercial – NoDerivs – 2.0 Generic (CC BY – NC – ND – 2.0)
Figure 13	Jeffrey Clade April 30, 2015	Electric Plug on fire	<a href="https://www.flickr.com/photos/132845931@N04/17133369338/in/photostream/"><u>https://www.flickr.com/photos/132845931@N04/17133369338/in/photostream/</u></a>	Creative Commons Attribution – NonCommercial – NoDerivs – 2.0 Generic (CC BY – NC – ND – 2.0)
Figure 14	Jeffrey Clade April 30, 2015	Frying pan with flames	<a href="https://www.flickr.com/photos/132845931@N04/17133369308/in/photostream/"><u>https://www.flickr.com/photos/132845931@N04/17133369308/in/photostream/</u></a>	Creative Commons Attribution – NonCommercial – NoDerivs – 2.0 Generic (CC BY – NC – ND – 2.0)
Video 17	York Technical College	HAZMAT	<a href="https://youtu.be/nNh4vu5sKFo"><u>https://youtu.be/nNh4vu5sKFo</u></a>	Creative Commons Attribution (CC BY)
Video 18	York Technical College	MSDS	<a href="https://youtu.be/6fZRvDglfVQ"><u>https://youtu.be/6fZRvDglfVQ</u></a>	Creative Commons Attribution (CC BY)
Link 1	Consumer Product	STP MSDS	<a href="http://whatsinproducts"><u>http://whatsinproducts</u></a>	All Rights Reserved,

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	Information Database		<a href="#">.com/files/brands_pdf/03027157%20MSDS%20STP%20Gas%20Treatment.pdf</a>	2001 – 2015 Delima Associates
Reference 1	United States Department of Labor: Occupational Safety & Health Administration (OSHA)	About OSHA	<a href="https://www.osha.gov/about.html">https://www.osha.gov/about.html</a>	Public Domain
Video 19	York Technical College	Common Shop Sense	<a href="https://youtu.be/nAVRLDcPy4w">https://youtu.be/nAVRLDcPy4w</a>	Creative Commons Attribution (CC BY)
Figure 15	Jonathon Stewart May 21, 2015	Module 5 Floor Plan	<a href="https://www.flickr.com/photos/125390477@N05/17749062879/in/contacts/">https://www.flickr.com/photos/125390477@N05/17749062879/in/contacts/</a>	Creative Commons Attribution – NonCommercial – NoDerivs – 2.0 Generic (CC BY – NC – ND – 2.0)
Reference 2	United States Department of Labor Occupational Safety & Health Administration (OSHA)	General Website	<a href="https://www.osha.gov/">https://www.osha.gov/</a>	Public Domain
Reference 3	National Safety Council (NSC)	General Website	<a href="http://www.nsc.org/pages/home.aspx">http://www.nsc.org/pages/home.aspx</a>	2015 National Safety Council, All Rights

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				Reserved
Reference 4	MSDS Solutions Center	General Website	<a href="http://www.msds.com/">http://www.msds.com/</a>	1991 – 2015 3E Company, All Rights Reserved
Reference 5	Safety Resource	General Website	<a href="http://www.safetyresource.org/">http://www.safetyresource.org/</a>	2015, All Rights Reserved
Link 6	National Fire Protection Association (NFPA)	General Website	<a href="http://www.nfpa.org/">http://www.nfpa.org/</a>	2015 National Fire Protection Association, All Rights Reserved



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