4-H Shooting Sports

Muzzle Loader Project

Muzzleloader Leader Should Have These Items

1) First Aid Kit
2) Cell phone or a phone close by
3) Sign in/out sheets and the release forms for all the people shooting
4) $C0_2$ ball discharger
5) Spare safety glasses and ear plugs
6) Range rod with accessories
    a) Patch worm, .45 & .50 Cal.
    b) Cleaning jag, .45 & .50 Cal.
    c) Ball puller, {this should be only used to pull a ball after the barrel has been soaked in water for one hour. Then hang a rope over a beam and attach it to the range rod and pull down.} **NEVER stand in front of the muzzle of a firearm to pull a projectile as you be directly in the line of fire.**
7) Ram rod puller or T-handle
8) Nipple wrench and nipple pick
9) Capper No. 11, musket and 209 primers.
10) Decapper for primers and caps.
11) Caps No. 11 and .209 primers
12) Short starter
13) Powder flask
14) Cleaning solvent {If you make your own, have it marked clearly.}
15) Cleaning patches and a hand towels
16) A safe place to shoot {Range or Club}
17) Safe place to load {muzzles down range} with benches or stands
18) Hair ties or a cap

Muzzle Loading Knowledge Requirements

A. Safe Gun Handling Rules

1) **ALWAYS KEEP YOUR MUZZLE POINTED IN A SAFE DIRECTION.**
2) **ALWAYS KEEP YOUR GUN UNLOADED UNTIL READY TO USE.**
3) **ALWAYS KEEP YOUR FINGER OFF THE TRIGGER UNTIL READY TO SHOOT.**

B. Types of Muzzle Loaders

1) **Matchlock:** The earliest type of lock. (See definition of lock in Section C.) Utilizing a burning cord in the jaws of a leaver, this arm is dropped forward into a pan of priming powder to ignite the main charge in the bore.
2) **Wheel lock:** A type of lock developed during the 16th century that produced a spark for ignition by placing a lump of iron pyrite against a rotating wheel: a forerunner of the flint lock. {Note: These locks were produced by clock makers using the same spring design as a wind up clock.}
3) **Flintlock:** A 16th and 17th century ignition system in which a flint strikes steel, dropping incandescent shavings {sparks} into a pan of priming powder. The flash sets off the main charge through a touch hole. This system lasted about 150 years, the longest used of the open system.
4) **Percussion lock:** A type of ignition system developed by Rev. Alexander Forsyth of Scotland, in the early 1800's. The lock employs a copper cap lined with a fulminate that explodes when struck by the hammer of the lock on the nipple. This system was soon replaced by the breach loading firearms. {a closed system}
5) **Inline:** A modern type of muzzle loading ignition system that uses a percussion cap or 209 shotgun primer, outside the barrel, directly behind the main charge. There are three basic types of inline muzzleloaders: the bolt action, the brake action, and the pivot action .

   Bolt action: Uses the bolt to strike the cap/primer. The cap/primer is loaded in the breech plug when the bolt is cocked. The bolt is cocked by pulling the handle on the side of the bolt up and back. The bolt remains back until the trigger is pulled .

   Brake action: A hammer strikes the cap/primer. The cap/primer is loaded in the breech plug by braking the firearm open much like the breech loading shotgun or rifle. The hammer is only cocked back when ready to fire.

   Pivot action: The hammer strikes the cap/primer. The cap/primer is loaded in the breech plug by pulling down on the trigger guard exposing the breech. After the cap/primer is loaded, the trigger is pivoted back into the stock. The hammer is not cocked until you are ready to fire.

Muzzle Loader: Is an open system firearm, which the propellant, and projectile are loaded from the muzzle end of the rifle. An open system refers to a firearm with a opening at both ends, such as the nipple, or touch hole and the muzzle.

C. Muzzle Loading Rifle Parts

Lock: Mechanical part of a muzzleloader or other firearm. All types of muzzleloaders have one.

Lock Parts

Lock plate: The metal plate to which the internal and external parts of the lock mechanism are attached.
Hammer: Mechanism that strikes the primer or frizzen. {flint lock}
Main Spring: The spring that powers the lock.
Tumbler: The catch that holds the hammer back at half and full cock.
Sear: The part of the lock that the trigger strikes to release the hammer.

Other parts of the Flint lock:
Cock or Hammer: Describes the flintlock mechanism that holds the piece of flint in it's jaws, and strikes the frizzen in order to produce spark. This is where the term draw back the cock, to half cock, or full cock comes from. {Cock your gun}
Frizzen: Sometimes referred to as the steel, pan cover, or battery. It is the portion of a flint lock which releases spark after being struck by a flint.
Flash Pan: On a flintlock, the shallow depression on the outside of the lock that holds the priming powder. Upon ignition by sparks from the frizzen, the flash pan directs the flame toward the touch hole, which ignites the powder in the barrel.
Frizzen Spring: The spring that holds the frizzen closed over the flash pan, covering the priming powder.

Stock: A wooden or composite piece acting as a handle for a firearm

Stock Parts

Butt: The part of the stock that rests against your shoulder when firing.
Toe: The bottom or the stock under the butt.
Heal: The top of the stock over the butt.
Comb or Cheek piece: The raised portion of the stock that comes into contact with your cheek when firing.
Wrist or Grip: The part behind the lock, held with your dominant hand when shooting.
Lock or Action area: Directly in front of the wrist that holds the lock and trigger.
Forearm: The part in front of the lock and under the barrel. Held in your non-dominant hand.

Barrel: Iron or steel tube that the bullet travels down when fired.

Barrel Parts

Bore: The interior of the barrel through which the bullet travels.
Rifling: The spiral lands and grooves cut into the bore of the barrel, which improve accuracy by imparting a spin to the projectile
Breech: The end of the barrel that is sealed by the breach plug or back of the barrel.
Breech Plug: A threaded plug which provides a gas tight seal for the rear of the barrel and to which the tang is attached.
Tang: An extension of the breech which attaches the barrel to the wrist on the stock.
Crown: The end of the barrel through which the powder and projectile are loaded.
Sights: Front and Rear, reference points used to align your eye up with the bore when shooting.
Drum or Snail: Found on a percussion gun, an extension on the side of the barrel which the nipple is screwed into. After the percussion cap is struck, the spark travels into the bore through this.
Flash Hole/Touch Hole: The vent through which a flintlock pan transmits it's flash to the main charge in the bore.

D. Powder/Types

Black Powder: Black powder is a combustible propellant used in muzzle loading firearms, a mixture of charcoal, sulfur and saltpeter. It is the only powder that should be used in a flint lock and is also the only propellant for muzzle loading firearms that is an explosive. All other black powder substitutes are considered flammables.

Black powder is broken down in grains to distinguish between fine and course.
Fg is cannon powder, very course
FFg for use in firearms .50 caliber and larger
FFFg for use in pistols and rifle .50 caliber and smaller
FFFFg for use in the priming pan of a flint lock, very fine and should never be put in the bore of a firearm, as it will create too much pressure for the barrel.

Pyrodex: A black powder substitute and is broken down into two different grades.
RS {rifle/shotgun} course powder to be used in .50 caliber firearms or larger.
P {pistol} fine powder to be used in .50 caliber firearms or smaller.

Triple Seven: Black powder substitute, burns cleaner than black powder and Pyrodex. Broken down into two different grades
FFg for use in .50 caliber and larger
FFFg for use in .50 caliber and smaller

Jim Shockey's Gold Powder: A black powder substitute, burns cleaner than black powder and Pyrodex. Broken down in two different grades.
FFg for use in .50 caliber and larger
FFFg for use in .50 caliber and smaller

NEVER MEASURE A BLACK POWDER SUBSTITUTE BY WEIGHT, AS MOST ARE LIGHTER THEN BLACK POWDER.

USE ONLY A VOLUME MEASURE!!!!!!!!

E. Eye Dominance

Determine your dominant eye for aiming. This will also determine which shoulder you will shoulder the gun. **Shoulder to your firearm on the same side as your dominate eye.**

Steps to determine dominate eye:

Step 1: Hold your arms in front of you, placing your hands together and forming a small opening between them. Keeping both eyes open, look through the opening at an object in the distance.
Step 2: Bring your hands back towards to your face – while still looking at the object.
Step 3: The eye you are now using to look at the object is your dominant eye.

F. Ammunition Basics

Components

1) **Propellant**: Black powder or a black powder substitute.
2) **Patch or Sabot:** Used as a seal around the projectile.
3) **Projectile:** Round ball or bullet.

Firing Sequence

1) **Load:** Powder, Patch, and Ball.
2) **Prime:** Cap or 209 primer on the nipple, {Flintlock 4 F powder in the pan and close frizzen}
3) **Cock:** Pull hammer/cock to back to full cock.
4) **Trigger:** pull back to release hammer.
5) **Hammer fall:** strikes cap/primer to ignite it {Flintlock, flint strike frizzen and sparks fall in pan.
6) **Primer ignition:** Spark from primer travels through the nipple to ignite the powder in the barrel.{flint lock, powder in the pan burns through the touch hole to ignite powder in the barrel.
7) **Powder ignition:** Powder in the barrel explodes sending the projectile out of the barrel.

Malfunctions

1) **Misfire:** When the loaded firearm fails to fire. To clear, try a second cap/primer. If this does not work, use CO_2 discharger to blow the ball and charge out of the barrel. **ALWAYS KEEP THE MUZZLE POINTED IN A SAFE DIRECTION**
2) **Hang fire:** A dangerous condition when a misfire goes off after a brief delay; could be as long as several seconds. Be sure to keep shooting position for a full ten (10) seconds after pulling trigger.

G. Safe Gun Handling Exercise

1) A firearm will always be transported in a case.
2) Never uncase your firearm until the range officer has given you permission.
3) Uncase your firearm at the firing line or in a safe direction {away from anything that you don't plan on shooting}
4) When uncasing your firearm, make sure the barrel is pointed down range or a safe direction. If you open your case and find the muzzle is pointing back toward the loading benches or in unsafe direction, **Stop, Turn the Case Around** and then uncase it.
5) Always use a two hand carry when moving a firearm.
6) Check and make sure that the muzzleloader is safe and unloaded.
    A) Make sure that there is no cap or primer on the nipple.
    B) Check to be sure that the muzzleloader is unloaded by lowering the range rod down the barrel until it stops. {Range Rod should be marked loaded and unloaded} If it isn't marked, you can mark the range rod at the muzzle and lay it along side of the barrel, to make sure it goes all the way to the breach. **If you think that your muzzle loader is loaded get the range officer's attention IMMEDIATELY.**
7) Obey all range commands and range rules. {Note: Range rules are often slightly different from range to range.}

H. TRANSPORTATION

All firearms must be transported to and from the range unloaded and in a enclosed case. When transported in a motor vehicle must be in the trunk or out of reach of driver and passengers.

4-H Shooting Sports - Muzzleloading Project
LOADING PROCEDURE

1. **Using a marked range rod**, verify that the muzzleloader is not loaded.

2. Rest muzzleloader securely against the loading bench. Using a ***cleaning jag***, run a cleaning patch ***dampened*** with solvent down the bore.

3. Next run a dry patch down the bore to ensure that there is no residual moisture in barrel. NOTE: You may need to run a second dry patch if the first one comes out wet. It may also be necessary to "pop a cap" to dry out the nipple if your patch was too wet ***(check with Range Officer)***.

4. Using a ***powder measure***, pour a pre-determined amount of powder from your can/flask/horn into the measure. Pour the powder from the measure down the bore. NOTE: Do not let your face get overtop of the muzzle.

NEVER POUR POWDER DIRECTLY FROM THE POWDER CONTAINER INTO A MUZZLELOADER!!!

5. Load bullet: If you are loading a ***patched round ball***, first center the lubricated patch over the muzzle. Place round ball in center of patch with the spur up and press firmly down. Using a short starter, start the ball with the button first then push it into the bore with the long end. If you are loading a ***sabot or conical bullet***, place the bullet into the end of the muzzle and use the short starter to push it into the bore.

6. Using the ramrod push the projectile down the bore and seat it against the powder charge. Remember to hold the ramrod close to the muzzle, and use short strokes. This will prevent the ramrod from breaking. ***Verify by the marked ramrod that the load is fully seated.***

7. Wait for Range Officers command to approach firing line.

8. Only when you are on the firing line and ready to shoot, cap or prime the muzzleloader. ***Eye and ear protection is required on the firing line.***

Range Commands for an Experienced Line

1) **Go forward and post targets**
2) **Shooters you have 5 minutes to prepare for the match/ or practice**. {In this time participants are to get out there equipment, uncase their guns, and make them safe.} NO!!! POWDER OUT AT THIS TIME !!!
3) **You may swab out your guns and pop caps.** {Shooters are to check there guns with range rod to see if it is loaded, then run a damp patch and a dry patch down the barrel. Once this has been done they are to proceed to the line and fire 2 caps; 1st one down the range, 2nd at a leaf or some grass on the ground to check and make sure the bore is clear.}
4) **Make your guns safe/or bench all guns.** {Guns should be in the rack with the range rod down the barrel.}
5) **Are all guns safe?** {Range officer: make sure no one is handling his or her gun.}
6) **You may now get your powder out and fill your flask /or powder horns.** {This is the only time there should be open powder.}
7) **Is the powder safe?** {Make sure that there are no open powder containers.}
8) **The match will be ___ minutes and ___ number of scored shots.** {Range officer will give the length of the match. }
9) **The Range is "Hot".** {At this time, shooters may load and go to the line and begin firing. The match has now begun. Remember no capped gun except on the shooting line. }
10) **5 Minute Warning**. {Shooters have 5 minutes left in the match. At this time, if they are finished shooting they can clean their guns and put away their equipment.}
11) **Are There Any Hot Ones?** {Make sure there are no loaded guns or guns in the processes of being loaded. If there are they should be dumped in the bank. "Discharged into the bank behind the targets"
12) **Cease-fire, make the Range Safe.** {Make sure all guns are safe, range rod down the barrel and in the rack. No one should be handling a gun at this time.}
13) **The Range is cold / or the range is safe**. {Check and make sure all equipment is safe.}
14) **You may go forward, pull and post targets.** {The only time anyone should be forward of the shooting line.}
15) **You may case your guns.** {Once every one is back behind the shooting line. .Then the Shooters may take there guns to the shooting line and case them.

Range Rules / Safety
Muzzle Loading Project

1) Always keep your muzzle pointed in a safe direction.
2) Always keep your finger off the trigger until your ready to shoot
3) Always treat **all** guns as if they are loaded.
4) Anyone seeing a safety issue will call **"Cease fire !!!"**
5) Safety glasses and ear protection will be worn by all people from the loading bench forward to the firing line.{glasses must be safety type or tempered prescription }
6) Obey all range commands.
7) No open powder containers when the range is "**HOT**".
8) Do not cap your guns until you are on the firing line.
9) Use a two hand carry, muzzle up, when handling your firearm.
10) Use a powder measurer to carry powder from your flask/powder horn to the muzzle of the gun.
11) Minimize the exposure of your hands over the muzzle when loading.
12) If you have a problem on the firing line, keep your muzzle pointed down range and get the attention of the range officer.
13) Never leave the line with a firearm that has not been discharged.
14) Never cross the firing line when the range is "**HOT**".
15) Always follow proper loading procedures.

Shooter Should Have
Muzzle Loading Project

1. Eye and ear protection
2. A muzzle loader
3. Range rod {mark it empty and loaded}
4. Cleaning jag or button
5. Patch worm
6. Powder measurer
7. Powder flask or horn
8. Loading patches and {lube if needed}
9. Bullets or round balls {sabots if needed}
10. Capper {the right one for the gun, 209, No.11or musket}
11. Cleaning supplies
    a. Cleaning patches {old cotton rags cut in about 2 inch squares}
    b. Cleaning solvent {if you make your own be sure it's clearly marked}
    c. W-D 40 to displace water
    d. Light gun oil or a bore butter {unsalted Crisco is same}
    e. Tooth brush for small parts and tight places
    f. Pipe cleaners
12. Nipple wrench and nipple pick
13. Wedge puller
14. Screw drivers, regular and phillps
15. Firing Caps
16. Black powder/Pyrodex
17. A tackle box or small tool box to carry it all in

Shooting Procedure

Stance, sight alignment, breath control, trigger control, follow through and self control.

1. Stand feet shoulder width apart, bring muzzle loader up to shooting position.
2. Align front and rear sight with dominate eye, then add target to finish alignment.
3. Take three deep breaths, hold the last, let out half, then slowly squeeze the trigger.
4. Hold your position until after the projectile has hit the target. Releasing your position prior will change your sight alignment.
5. Keep yourself focused on your shot and not on others around you.

Controls: Self/Trigger/Muzzle

1. Self: Each shooter must be in control of his/her own emotions and actions at all times.
2. Trigger: Keep your finger off the trigger until you are ready to shoot. This will prevent any premature firing of the muzzle loader.
3. Muzzle: Keep your muzzle pointed in a safe direction at all times. Muzzle up when going to and from, firing line. If you have a problem at firing line, keep muzzle pointed down range.

Cleaning Procedure

1. Muzzle loaders need to be cleaned after each shooting session. This will prevent the bore and other parts from rusting. {Black powder is very corrosive}
2. Assemble all needed equipment:
    A. Bucket of hot water and soap or other cleaning solvent {1/3 oil soap, 1/3 rubbing alcohol, 1/3 hydrogen peroxide or may purchase pre-mixed bore cleaner}
    B. Lots of dry patches
    C. Tooth brush for lock cleaning
    D. Gun oil, or a bore butter and WD-40
3. If solvent is used, pour down barrel and apply on dry patch. Rapidly run patch down barrel and use short up and down motion to clean barrel. Remove patch and repeat until patch comes out clean. If bucket of hot water and soap is used, remove barrel from stock, place in bucket and run patches through barrel until clean.
4. Clean around lock with toothbrush until clean. {about once a month the lock will need to be removed from the stock and powder residue will need to be scrubbed out of it and oil applied.}
5. Dry all surfaces, and apply oil, or bore butter.
6. Spray WD 40 down bore to bead up the moisture, then swab with dry patches to remove water. Apply gun oil or bore butter on patch and run down barrel to prevent rust.

Ingham County 4-H Shooting Sports

Annual Basic Muzzle Loader (ML) Project Participation Form

Shooter's Name:	**4-H Age ____ Beg. Jr. Sr.**
4-H Club Name:	**Date Started Course:**
Certified ML Instructor's Name:	**Phone:**
Equipment Used:	

Muzzle Loading Knowledge Requirements	Completion Date	Shooter's Initials	Instructor's Initials	Comments
A. Safe Gun Handling Rules				
B. Types of Muzzle Loaders				
C. Parts of the Muzzle Loader & their operations				
D. Powder Types & Grains				
E. Dominate Eye Exercise				Left/Right (Circle One)
F. Ammunition Basics				
G. Safe Gun Handling Practical Exercise				
H. Transporting Firearms				
Muzzle Loader Knowledge Verification			**Certified 4-H Shooting Sports Instructor Signature:**	

NOTE: For safety reasons these Requirements MUST be met before live fire exercises take place.

Basic Muzzle Loading Range Requirements	Completion Date	Shooter's Initials	Instructor's Initials	Comments
Loading Procedures				
Range Rules / Safety				
Range Commands				
Shooting Procedures				
Cleaning Procedures				
Control: Self, Trigger, Muzzle				
Shooting Fundamental Verification			**Certified 4-H Shooting Sports Instructor Signature:**	

This form must be completed and signed by a Michigan 4-H Shooting Sports "Certified Muzzle Loader Instructor". The instructor must be registered with the Ingham County 4-H Office. Completed forms must be presented to fair registrar each year.

By signing this form the instructor is verifying that the above named shooter has successfully completed the "4-H Basic Muzzle Loader Course" as outlined in the National 4-H Shooting Sports Curriculum and the training provided has been in compliance with the Michigan 4-H Shooting Sports Program "Safety Practices and Policies" document.