1. To safely and effectively handle weapons, Soldiers must be cognitively aware of three distinct weapons handling measures:
    a. The rules of firearms safety.
    b. Weapons safety status.
    c. Weapons control status.
2. What is rule 1 of firearm safety?
    a. Rule 1: Treat Every Weapon as if it is Loaded
    b. 1-7. Any weapon handled by a Soldier must be treated as if it is loaded and prepared to fire. Whether or not a weapon is loaded should not affect how a Soldier handles the weapon in any instance.
    c. 1-8. Soldiers must take the appropriate actions to ensure the proper weapon status is applied during operations, whether in combat or training.
3. What is rule 2 of firearm safety?
    a. Rule 2: Never Point the Weapon at Anything You Do Not Intend to Destroy
    b. 1-9. Soldiers must be aware of the orientation of their weapon's muzzle and what is in the path of the projectile if the weapon fires. Soldiers must ensure the path between the muzzle and target is clear of friendly forces, noncombatants, or anything the Soldier does not want to strike. When this is unavoidable, the Soldier must minimize the amount of time the muzzle is oriented toward people or objects they do not intend to shoot, while simultaneously applying the other three rules of fire arms safety.
4. What is rule 3 of firearm safety?
    a. Rule 3: Keep Finger Straight and Off the Trigger Until Ready to Fire
    b. 1-11. Soldiers must not place their finger on the trigger unless they intend to fire the weapon. The Soldier is the most important safety feature on any weapon. Mechanical safety devices are not available on all types of weapons. When mechanical safeties are present, Soldiers must not solely rely upon them for safe operation knowing that mechanical measures may fail.
    c. 1-12. Whenever possible, Soldiers should move the weapon to mechanical safe when a target is not present. If the weapon does not have a traditional mechanical safe, the trigger finger acts as the primary safety.
5. What is rule 4 of firearm safety?
    a. Rule 4: Ensure Positive Identification of the Target and its Surroundings
    b. 1-13. The disciplined Soldier can positively identify the target and knows what is in front of and what is beyond it. The Soldier is responsible for all bullets fired from their weapon, including the projectile's final destination.
    c. 1-14. Application of this rule minimizes the possibility of fratricide, collateral damage, or damage to infrastructure or equipment. It also prepares the Soldier for any follow-on shots that may be required.
6. The readiness of a Soldier's weapon is termed as its weapon safety status (WSS).
    a. It is a standard code that uses common colors (green, amber, red, and black) to represent the level of readiness for a given weapon.
7. Each color represents a specific series of actions that are applied to a weapon.

    a. The weapon safety status colors are used in training and combat to place or maintain a level of safety relevant to the current task or action of a Soldier, small unit, or group.
    b. Green, "Fully Safe" the weapon is clear, no ammunition is present the
    c. chamber is empty, and the fire selector switch is set to SAFE.
    d. Amber, "Substantially Safe" a leader must clear and verify that the weapon's bolt is forward, the chamber is empty, and ammunition is
    e. introduced to the weapon. This is an administrative or preparatory WSS. Leaders use amber primarily for mounted operations and during combat operations when directed to maintain a substantially safe weapon with the ability to rapidly transition and escalate to red or black, based on the situation.
    f. Red, "Marginally Safe" the fire selector switch is set to SAFE, the magazine
    g. is locked in the magazine well, a round is in the chamber, and the bolt is locked in the forward position.
    h. Black, "Not Safe" Indicates when the weapon is fully prepared to fire, the
    i. firer has positively identified the target, the fire selector switch is set to FIRE, and the firer's finger is on the trigger, and the fire is in the process of engaging the target.
8. What must leaders take into consideration when giving weapon control statuses?
    a. Tactical situation, rules of engagement for the area of operations, and expected or anticipated enemy contact. The WCS outlines the target identification conditions under which friendly elements may engage a perceived threat with direct fire. A weapon control status and a weapons safety status are both implemented and available to leaders to prevent fratricide and limit collateral damage. These postures or statuses are typically suited to the area of operation or type of mission and should alwaysbe clearly outlined to all Soldiers, typically in the operations order (OPORD), warning order (WARNORD), or fragmentary order (FRAGORD).
9. What is Overmatch?
    a. the Soldier applying their learned skills, employing their equipment, leveraging technology, and applying the proper force to create an unfair fight in favor of the Soldier.
10. What attributes contribute to a soldier's ability to utilize Overmatch?
    a. Smart - the ability to routinely generate understanding through changing conditions.
    b. Fast - the ability to physically and cognitively outmaneuver adversaries.
    c. Lethal - deadly in the application of force.
    d. Precise - consistently accurate in the application of power to ensure delivery of the right effects in time, space, and purpose.
11. What do target detection, acquisition, and identification describe?
    a. The ability of the Soldier to detect and positively identify any suspected target as hostile at greater distances than their adversary. This relies upon Soldier training and their ability to leverage the capabilities of their optics, thermals, and sensors.

12. How can Soldiers effectively engage targets at great engagement distances?
    a. It provides the Soldier with weapons, aiming devices, and ammunition capable of striking and defeating a threat at a greater range than the adversary can detect or engage the friendly force with effective fires.
13. How can soldiers effectively engage targets in limited visibility?
    a. Provide the Soldier the ability to make operations during limited visibility through technology and techniques, and compound their adversary's disadvantages during those conditions.
14. How can soldiers effectively engage targets with great precision?
    a. Provide a weapon and ammunition package that enhances the Soldier's consistent application of shots with a level of precision greater than the adversary's. Speed the weapon, aiming devices, and accessories a Soldier employs must seamlessly work in unison, be intuitive to use, and leverage natural motion and manipulations to facilitate rapid initial and subsequent shots during an engagement at close quarters, mid-, and extended ranges.
15. Why is Terminal Performance important to rifle marksmanship?
    a. Terminal performance ensures that precise shots delivered at extended ranges provide the highest probability to defeat the threat through exceptional ballistic performance.
16. Why is training important to create smart, fast, lethal, and precise soldiers?
    a. Training builds proficiency in a progressive, logical, and structured manner and provides Soldiers the skills necessary to achieve overmatch against any adversary. This requires the training program to provide experience to the Soldier in all the components of overmatch to their fullest extent possible in the shortest amount of time.
17. What is the first component of Overmatch at the soldier level?
    a. The ability to detect targets as far away as possible during limited and low visibility conditions. This manual describes the aiming devices for the service rifle that enhance the Soldier's target detection and acquisition skills. The Soldier must be able to detect, acquire, and identify targets at ranges beyond the maximum effective range of their weapon and ammunition.
18. Why is it important for soldiers to have weapon systems that have a greater range than their adversaries?
    a. This creates a standoff distance advantage that allows friendly forces to destroy the target outside the threat's maximum effective range. Range overmatch provides a tactical engagement buffer that accommodates the Soldier's time to engage with precision fires. For example, a Soldier that has the capability to effectively engage personnel targets at a range of 500 meters will have a range overmatch of 10 to 20 percent over a threat rifleman. That 10 to 20 percent range difference is equivalent to a distance of 40 to 80 meters, which is approximately the distance a maneuvering threat can traverse in 15 to 40 seconds.

19. What helps soldiers detect, acquire, identify, and engage threats in all light conditions regardless of the tactical situation?
    a. Aiming devices are provided that minimize the effects of limited visibility, but not completely. Image intensifiers and thermal optics provide a significant overmatch capability, but they also have limitations and disadvantages. A general discussion of their capabilities, particularly what those systems can view within the spectrum of light is provided. Soldiers must understand what can be "seen" or viewed and what cannot when using their assigned equipment. Understanding the advantages and limitations of their equipment has a direct impact on force protection, fratricide and collateral damage prevention, and maintaining overmatch during tactical operations.
20. The Army standard service rifle is designed with a specific level of accuracy out to its maximum effective range. What is important to understand about the Army standard service rifle?
    a. This level of accuracy is more consistent and reliable through the use of magnified aiming devices and superior ammunition. The Soldier must build the skills to use them effectively to deliver precision fires during tactical engagements.
21. The close fight requires rapid manipulations, a balance of speed and accuracy, and very little environmental concerns.
    a. Soldiers must move quickly and efficiently through their manipulations of the fire control to maintain the maximum amount of muzzle orientation on the threat through the shot process. This second-nature efficiency of movement only comes from regular practice, drills, and repetition.
22. How is the foundation of speed built?
    a. Through understanding the weapon, ammunition, ballistics, and principles of operation of the associated aiming devices. It is reinforced during drills (appendix D), and the training program of the unit.
23. What is the goal of training to overmatch?
    a. Increase the speed at which the soldier detects a threat, identifies it as hostile, and executes the shot process with the desired target effect. This manual is constructed to provide the requisite information in a progressive manner to build and reinforce Soldier understanding, confidence, and ability to execute tactical operations with speed and smooth fluidity of motion.
24. What is terminal ballistic performance?
    a. The actions of a projectile from the time it strikes an object downrange until it comes to rest. The ammunition used with the service rifle performs exceptionally well out to its maximum effective range and beyond.
25. Why must soldiers understand the capabilities of their ammunition and weapon system?
    a. That understanding creates a respect for the weapon and ammunition, reinforces the precepts of safe weapons handling, and an understanding of the appropriate skills necessary to deliver lethal fires.
26. Why should Soldiers understand the "how" and "why" of their weapon system, aiming devices, ammunition, and procedures?

    a. That level of understanding, coupled with a rigorous training program that builds and strengthens their skills create more proficient Soldiers. The proficiencies and skills displayed during training translate into smart, fast, lethal and precise Soldiers for the small unit during decisive action combat operations.

27. What is the standard service rifle for the US Army?
    a. The M16-series rifle or M4-series carbine. These weapons are described as a lightweight, 5.56-mm, magazine-fed, gas- operated, air-cooled, shoulder-fired rifle or carbine. They fire in semiautomatic (single-shot), three-round burst, or in automatic mode using a selector lever, depending on the variant. The weapon system has a standardized mounting surface for various optics, pointers, illuminators, and equipment, to secure those items with common mounting and adjustment hardware.
28. What are weapon components?
    a. Are uniquely identifiable group of fitted parts, pieces, assemblies or subassemblies that are required and necessary to perform a distinctive function in the operation of the weapon. Components are usually removable in one piece and are considered indivisible for a particular purpose or use.
29. What are weapon assemblies?
    a. Are a group of subassemblies and parts that are fitted to perform specific set of functions during operation, and cannot be used independently for any other purpose.
30. What are weapon subassemblies?
    a. Are a group of parts that are fitted to perform a specific set of functions during operation. Subassemblies are compartmentalized to complete a single specific task. They may be grouped with other assemblies, subassemblies and parts to create a component.
31. What are weapon parts?
    a. Are the individual items that perform a function when attached to a subassembly, assembly, or component that serves a specific purpose.
32. What two components comprise of weapon systems?
    a. the upper receiver and the lower receiver. These components are described below including their associated assemblies, subassemblies, and parts.
33. What is the barrel?
    a. The bore and chamber of the barrel are chrome-plated to reduce wear and fouling over the life of the weapon.
34. What is the flash hider and compenstor?
    a. Located at the end of the barrel, is provided to reduce the signature of the weapon during firing and reduce barrel movement off target during firing.
35. What is the sling swivel?
    a. The attachment hardware for the sling system used to properly carry the weapon.
36. What is the front sight assembly?
    a. Includes an adjustable front sight post that facilitates zeroing the weapon, serves as the forward portion of the iron sight or back up iron sight, and assists with range determination.

37. What is the adapter rail system?
    a. Provided in varying lengths, depending on the variant applied. Used to attach common aiming devices or accessories.
38. What does the slip ring do?
    a. Provides a spring loaded locking mechanism for the weapon's hand guards.
39. What does the Ejection port do?
    a. Provides an opening in the upper receiver to allow ammunition or spent casing ejection from the weapon.
40. What does the dust cover do?
    a. Provides a dust cover for the ejection port, protecting the upper receiver and bolt assembly from foreign objects.
41. What does the Forward assist assembly do?
    a. Provides a Soldier applied mechanical assist to the bolt assembly during operations.
42. What is the purpose of the trigger assembly?
    a. Provides the trigger, pins, springs, and other mechanical components necessary to fire the weapon.
43. What is the bolt catch?
    a. A mechanical lever that can be applied to lock the bolt to the rear by the Soldier, or automatically during the cycle of function when the magazine is empty
44. What is the rifle grip?
    a. An ambidextrous pistol-type handle that assists in recoil absorption during firing.
45. What is the purpose of the magazine catch assembly?
    a. Provides a simple, spring-loaded locking mechanism to secure the magazine within the magazine well. Provides the operator an easy to manipulate, push-to-release textured button to release the magazine from the magazine well during operation.
46. What is the purpose of the buttstock assembly?
    a. Contains the components necessary for proper shoulder placement of the weapon during all firing positions, returning the bolt assembly to battery, and managing the forces of recoil during operation.
47. What type of buttstock does the M4/M4A1 have?
    a. Four position collapsible buttstock assembly: Closed, ½ open, ¾ open, and fully-open.
    b. What type of buttstock does the M16 have? fixed buttstock with cleaning kit compartment or an applied modified work order (MWO) collapsible buttstock.
48. What does the action spring do?
    a. Provides the stored energy to return the bolt carrier assembly back into battery during operation.
49. What does the lower receiver extension do?
    a. Provides space for the action spring and buffer assembly during operation.
50. What is a cycle of function?

    a. Mechanical process a weapon follows during operation. The information provided below is specific to the cycle of function as it pertains specifically to the M4- and M16-series weapons.

51. What are the phases of the cycle of operations?
    a. Feeding.
    b. Chambering.
    c. Locking.
    d. Firing.
    e. Unlocking.
    f. Extracting.
    g. Ejecting.
    h. Cocking.
52. What is the system of operation of the AR platform?
    a. The M4- and M16-series weapons use a direct impingement gas operating system. This system uses a portion of the high pressure gas from the cartridge being fired to physically move the assemblies and subassemblies in order to complete the cycle of function.
53. What is the Feeding process?
    a. Process of mechanically providing a cartridge of ammunition to the entrance of the chamber
54. What is the chambering process?
    a. The continuing action of the feeding round into the chamber of the weapon
55. What is the locking process?
    a. Process of creating a mechanical grip between the bolt assembly and chamber with the appropriate amount of headspace (clearance) for safe firing (see figure 2-5). With the M4- and M16-series weapons, locking takes place simultaneously with the final actions of chambering.
56. What is the firing process?
    a. Finite process of initiating the primer detonation of the cartridge and continues through shot-exit of the projectile from the muzzle
57. What is the unlocking process?
    a. Process of releasing the locking lugs on the bolt face from the corresponding recesses on the barrel extension surrounding the chamber area
58. What is the extracting process?
    a. Removal of the expended cartridge case from the chamber by means of the extractor
59. What is the ejecting process?
    a. Removal of the spent cartridge case from the weapon itself
60. What is the cocking process?
    a. Cocking is the process of mechanically positioning the trigger assembly's parts for firing (see figure 2-10). The cocking phase completes the full cycle of functioning.
61. What is cooling?
    a. The process of dissipating heat from the weapon during firing

62. How hot is the temperature of the burned propellant used in rifle cartridges?
    a. One thousand degrees Fahrenheit. Some of the heat produced during firing is retained in the chamber, bore, and barrel during firing and poses a significant hazard to the firer.
63. How is heat absorbed and dissipated throughout the weapon system?
    a. Lightweight weapons like the M4 and M16 do not have sufficient mass to withstand thermal stress efficiently. The weapon system must have a means to radiate the heat outward, away from the barrel to allow continuous firing.
64. The M4- and M16-series of weapons use what three methods to varying degrees to cool the chamber, bore, and barrel to facilitate continuous operation?
    a. Radiational Cooling
    b. Conduction Cooling
    c. Convection Cooling
65. How does radiational cooling work?
    a. It allows for the dissipation of heat into the surrounding cooler air. This is the least efficient means of cooling, but is common to most small arms weapons, including the rifle and carbine.
66. How does Conduction cooling work?
    a. It occurs when a heated object is in direct physical contact with a cooler object. Conduction cooling on a weapon usually results from high chamber operating temperatures being transferred into surrounding surfaces such as the barrel and receiver of the weapon. The transfer from the chamber to the cooler metals has the net effect of cooling the chamber. Thermal energy is then carried away by other means, such as radiant cooling, from these newly heated surfaces.
67. How does Convection cooling work?
    a. It requires the presence of a moving air current. The moving air has greater potential to carry away heat. The hand guards and ARS of the rifle and carbine are designed to facilitate air movement. The heat shield reflects heat energy away from the hand guard and back towards the barrel. The net effect is an updraft that brings the cooler air in from the bottom. This process establishes a convection cycle as heated air is continually replaced by cooler air.
68. Soldiers should be aware of the principles of the weapon's cooling methods' direct effects on their line of sight when:
    a. Viewing a target through an aiming device.Dissipating heat along the length of the barrel can create a mirage effect within the line of sight which can cause a significant error to the true point of aim when using magnified optics.
69. What types do iron sights come in?
    a. Iron sights (rear aperture and front sight post).
    b. Back up iron sights (BUIS).
70. Optical sights are used predominantly for day firing, with limited night capability. What are the types of optical sights?
    a. Close Combat Optic (CCO).
    b. Rifle Combat Optic (RCO, previously referred to as the Advanced Combat Optic Gunsight or ACOG).

    c. Thermal. These are electronic sighting systems that provide a view of the field of view (FOV) based on temperature variations.
71. Pointer/Illuminator/Laser. These aiming devices use either a laser beam, flood light, or other light to aim the weapon at the target. What three types of illuminators does the army use?
    a. Advanced Target Pointer Illuminator Aiming Light (ATPIAL).
    b. Dual Beam Aiming Laser-Advanced (DBAL-A2).
    c. Illuminator, Integrated, Small Arms (STORM).
72. What two types of angular measurements does the Army use?
    a. Mils and minutes of angle (MOA). These two different units are commonly used terms to describe a measurement of accuracy when firing a weapon, system, or munition. They typically include the accuracy of a specific weapon, the performance of ammunition, and the ability of a shooter as it relates to firing the weapon. A minute of angle (MOA) is an angular unit of measurement equal to 1/60th of a degree (see figure 3-1). The most common use of MOA is when describing the distance of change required when zeroing a weapon.
73. What is one minute of angle?
    a. 1.047 inches per 100 yards. For most applications, a Soldier can round this to 1 inch at 100 yards or 1.1 inches at 100 meters to simplify their arithmetic.
74. What is a mil commonly used for?
    a. Direct fire and indirect fire applications.
75. When is the mil to degree relationship used?
    a. When describing military reticles, ballistic relationships, aiming devices, and on a larger scale, map reading and for indirect fire.
76. What is a reticle?
    a. A series of fine lines in the eyepiece of an optic, such as a CCO, TWS, or RCO (see figure 3-3) used as a measuring scale with included aiming or alignment points. Reticles use either mils or minute of angle for their unit of measurement.
77. What is a stadia metric reticle?
    a. Commonly used in the thermal weapon sight, a stadia reticle provides a means of rapidly determining the approximate range to target of a viewed threat, based on its standard dimensions. The stadia reticle (sometimes referred to as "stadiametric" or "choke sight") can provide approximate range to target information using width or height of a viewed dismounted target using standard threat dimensions (see figure 3-4).
78. How do the vertical and horizontal stadia reticles function in a thermal weapon sight?
    a. Vertical stadia. At the lower left of the sight picture, Soldiers can evaluate the range to target of a standing dismounted threat.
    b. Horizontal stadia. In the upper right portion of the sight picture, Soldiers can evaluate the range to target of an exposed dismounted threat based on thewidth of the target.
79. What is a major concern for effective use of thermal optics?
    a. Not only understanding how they function, but also what they can "see". Each device develops a digital representation of the scene or view it is observing

based on what frequencies or wavelengths it can detect within the electromagnetic spectrum.

80. How do thermal optics work?
    a. This equipment operates in the mid- and far-wavelength of the infrared band, which is the farthest of the infrared wavelengths from visible light. Thermal optics cannot translate ("see") visible light. Thermal optics cannot "see" infrared equipment such as infrared (IR) strobe lights, IR chemical lights, illuminators, or laser pointers. They can only identify emitted radiation in the form of heat
81. How do image intensifiers work?
    a. This equipment, such as night vision devices, use the near area of the infrared spectrum closest to the frequencies of visible light, as well as visible light to create a digital picture of the scene. These systems cannot "see" or detect heat or heat sources.
82. Image intensifiers generally operate on the principles of convection, conduction, and radiation by:
    a. The sights "picking up" or translates the IR wavelength (or light) that is emitted from a target scene through one of those three methods.
83. What conditions create suboptimal function with thermal and image intensifiers?
    a. Rain - absorbs the IR emitted by the target, makes it difficult to see.
    b. Water - acts as a mirror and generally reflects IR, providing a false thermal
    c. scene.
    d. Glass - acts similar to water, interfering with the sensor's ability to accurately detect emitted radiation behind the glass.
84. Which situations can IR see better?
    a. Smoke - will not obscure a target unless the chemical obscurant is extremely hot and dense, or if the target is sitting on top of the smoke source.
    b. Dust - may interfere with the accurate detection of the emitted thermal
    c. signature due to dust and debris density between the sensor and the target
    d. scene. Dust typically does not obscure the IR signature unless its temperature
    e. is similar to the target's.
85. What are Optics?
    a. Sighting aids for rifles and carbines that provide enhanced aim point reticles, and may include magnified fields of view. Optics are specific to day operations, although may be used during limited visibility or night operations. They do not have any method of enhancing low light conditions.
86. What 4 types of optics are generally available for the M16/M4 series rifle?
    a. Iron Sight.
    b. Back Up Iron Sight (BUIS).
    c. CCO, M68.
    d. RCO, M150.
87. Some versions of the M4 and M16 come with a
    a. carrying handle with an integrated rear aperture. The carrying handle may or may not be removable, depending on the version of the service rifle. The integrated rear aperture includes adjustments for both azimuth (wind) and elevation.

Specific instructions for zeroing these aiming devices are found in the respective weapon's technical manual.

88. What two apertures are available for the carrying handle?
    a. Small aperture. Used for zeroing procedures and for mid- and extended-range engagements.
    b. Large aperture. Used during limited visibility, close quarters, and for moving targets at close or mid-range.

89. What is the BUIS (Back Up Iron Sights)?
    a. Semi-permanent flip-up sight equipped with a rail-grabbing base. The BUIS provides a backup capability effective out to 600 meters and can be installed on M16A4 rifles and M4-series carbines. The BUIS on the first notch of the integrated rail, nearest to the charging handle. The BUIS remains on the modular weapon system (MWS) unless the carrying handle/sight is installed.
90. What is the M68 CCO?
    a. Non-telescopic (unmagnified) reflex sight that is designed for the "eyes-open" method of sighting (see figure 3-8). It provides Soldiers the ability to fire with one or two eyes open, as needed for the engagement sequence in the shot process. The CCO provides a red-dot aiming point using a 2 or 4 MOA diameter reticle, depending on the variant. The red dot aiming point follows the horizontal and vertical movement of the firer's eye, allowing the firer to remain fixed on the target. No centering or focusing on the front sight post is required. There are three versions of the CCO available in the force.
91. What happens when the CCO is zeroed to its weapon?
    a. It must remain matched with the same weapon, attached at the same slot in the attached rail system or be re-zeroed. If the CCO must be removed for storage, Soldiers must record the serial number and the rail slot to retain zero.
92. What advantage does the CCO offer over other iron sights?
    a. The speed advantage over iron sights in most if not all engagements. The adjustments on brightness allow the Soldier to have the desired brightness from full daylight to blackout conditions.
93. What are disadvantages of the CCO?
    a. The CCO lacks a bullet drop compensator or other means to determine accurate range to target beyond 200m.
94. What does the RCO do?
    a. Provide enhanced target identification and hit probability for the M4-/M4A1- or M16-series weapon. The reticle pattern provides quick target acquisition at close combat ranges to 800 meters using the bullet drop compensator (BDC) (see figure 3-10 on page 3-15). It is designed with dual illuminated technology, using fiber optics for daytime employment and tritium for nighttime and low-light use.

95. What is the RCO?
    a. Lightweight, rugged, fast, and accurate 4x power optic scope specifically designed to allow the Soldier to keep both eyes open while engaging targets and maintain maximum situational awareness.
96. What are advantages of the RCO?
    a. The bullet drop compensator (BDC) is accurate for extended range engagements using either M855 or M855A1 ball ammunition. The ballistic difference between the two rounds is negligible under 400 meters and requires no hold determinations. This is a widely fielded optic that is rugged, durable, and operates in limited light conditions. The self-illuminating reticle allows for continuous operations through end evening nautical twilight (EENT).
97. What are disadvantages of using the RCO?
    a. This optic's ocular view is limited when engaging targets in close quarters engagements. This requires additional training to master the close quarter's skills while employing the RCO to achieve overmatch against the threat.
    b. The RCO reticle does not include stadia lines. Windage must be applied by the shooter from a determined estimate. The RCO has a specific eye relief of 70-mm (millimeter) or 1.5 inches. If the eye relief is not correct, the image size will be reduced.
    c. The fiber optic illuminator element can provide excessive light to the reticle during certain conditions that produce a glare. The RCO does not have a mechanical or built in method to reduce the effects of the glare created.
    d. The increased lighting may interfere with the shooter's point of aim and hold determinations. Soldiers may use alternate methods to reduce the glare by reducing the amount of fiber optic exposed to direct sunlight during operating conditions.
98. What do thermal sights use to function?
    a. They use advanced forward- looking infrared technology that identify the infrared emitted radiation (heat) of a field of view, and translate those temperatures into a gray- or color-scaled image. The TWS is capable of target acquisition under conditions of limited visibility, such as darkness, smoke, fog, dust, and haze, and operates effectively during the day and night.
99. The TWS is composed of five functional groups:
    a. Objective lens - receives IR light emitting from an object and its surroundings. The objective lens magnifies and projects the IR light.
    b. Detector assembly - senses the IR light and coverts it to a video signal.
    c. Sensor assembly - the sensor electronics processes the video for display on the liquid crystal display (LCD) array in the field of view.
    d. LCD array/eyepiece - the LCD array provides the IR image along with the reticle selected. The light from the LCD array is at the eyepiece.
    e. User controls - the control electronics allows the user to interface with the device to adjust contrast, thermal gain, sensitivity, reticle display, and magnification.
100. Military grade weapon thermal weapon sights are designed with what advantages?
    a. Small and lightweight.

b. Real-time imagery. Devices provide real-time video of the thermal scene immediately after power on.
c. Long-lasting battery life. Low power consumption over time.
d. Reliable. Long mean time between failures (MTBF).
e. Quiet. The lack of a cooling element allows for a very low operating noise level.
f. One optic fits on multiple weapons. The use of the ARS rail mounting bracket allows for the same optic to be used on other weapons.
g. The F- and G-models attach in front of other aiming devices to improve their capabilities and eliminate the zeroing procedures for the device.

101. What are the disadvantages of using a thermal weapon sight?
a. Cannot interpret ("see") multispectral infrared. These systems view a specific wavelength for emitted radiation (heat variations), and do not allow viewing of all aiming and marking devices at night.
b. Reliance on rechargeable batteries and charging stations. Although the batteries are common and have a relatively long battery life, additional equipment is required to charge them. If common nonrechargeable (alkaline) batteries are used, a separate battery adapter is typically required.
c. Cannot interpret thermal signatures behind glass or water effectively.

102. What are the basic two functions of PEQ systems?
a. Pointer. When used as a pointer or aiming device, a small, pin-point beam is emitted from the device. The IR beam provides an infrared visible point when it strikes an object or target. The IR beam operates in the 400 to 800 nanometer wavelength and can only be seen by I2 optics, such as the AN-PVS-7 or -14 night vision devices.
b. Illuminator. Typically used to illuminate a close quarters area as an infrared flood light. The illuminator provides a flood-light effect for the Soldier when used in conjunction with I2 night vision devices.

103. What are AN/PEQ-2 aiming devices?
a. Class IIIb laser devices that emit a collimated beam of IR light for precise aiming and a separate IR beam for illumination of the target or target area (see figure 3-14 on page 3-21). Both beams can be independently zeroed to the weapon and to each other. The beams can be operated individually or in combination in both high and low power settings.

104. What are PEQ systems commonly used with?
a. Night observation devices (NODs) and can be used as handheld illuminators/pointers or mounted on the weapon with the included brackets and accessory mounts. In the weapon-mounted mode, the aiming devices can be used to direct fire and to illuminate and designate targets.

105. How is the aiming light activated?
a. Either switch connects power from two AA batteries to an internal electronic circuit which produces the infrared laser. Internal lenses focus the infrared light into a narrow beam. The direction of the beam is controlled by rotating the mechanical Adjusters with click detents. These adjusters are used to zero the aiming light to the weapon.

106. How do aiming lights work when zeroed to the weapon?
    a. The aiming light projects the beam along the line of fire of the weapon. The optical baffle prevents off-axis viewing of the aiming light beam by the enemy.
107. What is the AN/PEQ-15 ATPIAL
    a. Multifunctional laser that emits both a visible and IR light for precise weapon aiming and target/area illumination. This ruggedized system can be used as a handheld illuminator/pointer or can be mounted to weapons equipped with an M4- or M5-ARS (Military Standard [MIL STD] 1913).
108. How is visible light useful?
    a. Can be used to boresight the device to a weapon without the need of night vision goggles. A visible red-dot aiming laser can also be selected to provide precise aiming of a weapon during daylight or night operations.
109. How does the infrared laser work?
    a. Emit a highly collimated beam of IR light for precise weapon aiming. A separate IR-illuminating laser can be adjusted from a flood light mode to a single point spot-divergence mode.
110. How can the lasers be used?
    a. Handheld illuminator pointers, or can be weapon-mounted with included hardware. The co-aligned visible and IR aiming lasers emit through laser ports in the front of the housing. These highly capable aiming lasers allow for accurate nighttime aiming and system boresighting.
111. The AN/PEQ-15 has an
    a. Integrated rail grabber molded into the body to reduce weight and additional mounting hardware. The AN/PEQ-15, ATPIAL's visible aiming laser provides for active target acquisition in low light conditions and close-quarters combat situations, and allows users to zero using the borelight without using NOD. When used in conjunction with NODs, its IR aiming and illumination lasers provide for active, covert target acquisition in low light or complete darkness.
112. What is the AN/PEQ-15A DBAL-A2?
    a. Multifunctional laser device that emits IR pointing and illumination light, as well as a visible laser for precise weapon aiming and target/area illumination. The visible and IR aiming lasers are co-aligned enabling the visible laser to be used to boresight both aiming lasers to a weapon without the need for night vision devices. This ruggedized system can be used as a handheld illuminator/pointer or can be mounted to weapons equipped with an M4 or M5 adapter rail system The AN/PEQ-15A, DBAL-A2 visible aiming laser provides for active target acquisition in low light conditions and close quarters combat situations, and allows users to zero using the borelight without using NODs. When used in conjunction with NODs, its IR aiming and illumination lasers provide for active, covert target acquisition in low light or complete darkness. The AN/PSQ-23 is a battery operated laser range finder (LRF) and digital magnetic compass (DMC) with integrated multifunctional lasers. The illuminator, integrated, small arms device is commonly referred to as the STORM laser. The visible and IR aiming lasers are co-aligned enabling the visible laser to be used to boresight

both aiming lasers to a weapon without the need for night vision devices. This ruggedized system can be used as a handheld illuminator/pointer or can be mounted to weapons equipped with an M4 or M5 adapter rail system

113. What does a laser range finder do?
    a. Provides range to target information from 20 meters to 10,000 meters with an accuracy of +/- 1.5 meters.
114. What does the digital magnetic compass do?
    a. Provides azimuth information and limited elevation information to the operator. The azimuth accuracy is +/- 0.5 degrees to +/- 1.5 degrees. The elevation accuracy is +/- 0.2 degrees. The DMC can identify bank or slopes up to 45 degrees with an accuracy of +/- 0.2 degrees.
115. What do the integrated visible aim laser (VAL) and illumination lasers provide?
    a. Active, covert target acquisition in low light or complete darkness when used in conjunction with night vision devices. The STORM is also equipped with a tactical engagement simulation (TES) laser allowing it to be used in a laser-based training environment.
116. What does the AN/PEQ-15A, DBAL-A2 visible aiming laser provide?
    a. For active target acquisition in low light conditions and close-quarters combat situations, and allows users to zero using the borelight without using NODs. When used in conjunction with NODs, its IR aiming and illumination lasers provide for active, covert target acquisition in low light or complete darkness.
117. What does the ARS provides a secure mounting point for?
    a. Various accessories that may be mounted on the weapon's top, bottom, left, and right. Each rail groove has an incremental number identifying the slot location, starting from the rear of the weapon.
118. What should soldiers record on the ARS?
    a. Attachment or equipment's serial number (if applicable), the location of the attachment (for example, markings between lugs), and any boresight or alignment settings specific to the equipment at that location.
    b. Soldiers must ensure the equipment is firmly affixed to the ARS before tie down is complete. If the attachments are loose, their accuracy and effectiveness will be degraded.
119. What two types of weapons that can be physically attached to the M16-/M4-series rifles?
    a. grenade launchers and shotguns.
120. What is the M320/M320A1?
    a. The M320/M320A1 grenade launcher is a lightweight grenade launcher that can
    b. operate in a stand-alone or attached configuration. The M320/M320A1 grenade launcher uses an integrated double-action-only trigger system. The M320 series is the
    c. replacement weapon for the M203.
121. Each mountable 40mm grenade launcher provides the following capabilities to the small unit:
    a. Star cluster, white.

b. Star parachute, white.
c. Star parachute, green.
d. Star parachute, red.
e. Smoke, yellow.
f. Smoke, green.
g. Smoke, red.
h. Illumination, infrared.
i. High explosive (HE).
j. High explosive, dual purpose (HEDP).
k. Nonlethal.
l. Training practice (TP).

122. What is the M26 and what purpose does it have?
    a. The M26 Modular Accessory Shotgun System (MASS) is an under-barrel shotgun attachment for the M16/M4/M4A1. The M26 uses a 3- or 5-round detachable box magazine and provides Soldiers with additional tactical capabilities.
123. The M26 provides specific tactical capabilities to the Soldier using the following ammunition:
    a. Slug.
    b. Door breaching.
    c. Shot range, 00 buckshot.
    d. Nonlethal, rubber slug, buckshot, and riot control.
124. What are mountable accessories and what is their purpose?
    a. Mountable accessories are items that may be attached to a weapon but are not required for operation. They provide assistance stabilizing the weapon or provide white- light illumination for specific tactical operations. These devices are authorized as needed by the small unit. Some mountable accessories are aftermarket (commercial-off-the-shelf, or COTS) items that use the ARS for semi permanent attachment.
125. Vertical foregrips (VFGs) assist in transitioning from target to target in close quarter combat. What should the soldier keep in mind when using Vertical Foregrips?
    a. The further out the Soldier mounts the VFG, the smoother and quicker his transitions between multiple targets will be, however he should not mount it so far forward that using the VFG is uncomfortable.
126. VFGs with integrated bipods are acceptable for common use. How do they benefit soldiers?
    a. They combine the VFG capability with a small, limited adjustment bipod. They typically lack the full adjustment capabilities of full bipods, but provide a compact stable extrusion for the fire.
127. The weapon-mounted lights are commonly issued throughout the Army. What are their purpose?
    a. The purpose of the weapon mounted lights is to provide illumination and assist in target acquisition and identification during limited visibility operations.

128. How should weapon lights be placed on the weapon?
    a. The weapon mounted lights should be mounted in such a manner that the Soldier can activate and deactivate them efficiently and their placement does not hinder the use of any other attachment or accessory. They must be attached in such a manner as to prevent negligent or unintentional discharge of white light illumination during movement or climbing.
129. What tasks are directly influenced by the Soldier's ability to hit the target under conditions of extreme stress?
    a. Accurately interpret and act upon perceptual cues related to the target, front and rear sights, rifle movement, and body movement. Execute minute movements of the hands, elbows, legs, feet, and cheek. Coordinate gross-motor control of their body positioning with fine-motor control of the trigger finger.
130. Regardless of the weapon system, what the goal of shooting is to make well-aimed shots. What must soldiers do to acheive this end state?
    a. Properly point the weapon (sight alignment and sight picture).
    b. Fire the weapon without disturbing the aim.
131. To make well aimed shots, Soldiers must master what fundamentals of marksmanship?
    a. Sight alignment - sight alignment is the relationship between the aiming device and the firer's eye. To achieve proper and effective aim, the focus of the firer's eye needs to be on the front sight post or reticle. The Soldier must maintain sight alignment throughout the aiming process. Sight picture - the sight picture is the placement of the aligned sights on the target. Trigger control - the skillful manipulation of the trigger that causes the rifle to fire without disturbing the aim.
132. The shot process is the basic outline of an individual engagement sequence all firers consider during an engagement, regardless of the weapon employed. Why is the shot process so important?
    a. The shot process formulates all decisions, calculations, and actions that lead to taking the shot. The shot process may be interrupted at any point before the sear disengaging and firing the weapon should the situation change.
133. The shot process has three distinct phases. What are they?
    a. Pre-shot.
    b. Shot.
    c. Post-shot.
134. The shot process allows the Soldier to focus on one cognitive task at a time. How can soldiers use the shot process to make effective hits?
    a. The Soldier must maintain the ability to mentally organize the shot process's tasks and actions into a disciplined mental checklist, and focus their attention on activities which produce the desired outcome; a well-aimed shot.
135. What must soldiers do to make well aimed shots?
    a. Soldiers must understand and correctly apply the shot process. The sequence of the shot process does not change, however, the application of each element vary based on the conditions of the engagement.
136. What are the functional elements of the shot process?

a. The linkage between the Soldier, the weapon system, the environment, and the target that directly impact the shot process and ultimately the consistency, accuracy, and precision of the shot. When used appropriately, they build a greater understanding of any engagement.

137. How is stability demonstrated throughout the shot process?
    a. The Soldier stabilizes the weapon to provide a consistent base to fire from and maintain through the shot process until the recoil pulse has ceased. This process includes how the Soldier holds the weapon, uses structures or objects to provide stability, and the Soldier's posture on the ground during an engagement.

138. What is the process of aiming?
    a. The continuous process of orienting the weapon correctly, aligning the sights, aligning on the target, and the appropriate lead and elevation (hold) during a target engagement.
139. How is control demonstrated in the shot process?
    a. All the conscious actions of the Soldier before, during, and after the shot process that the Soldier specifically is in control of. The first of which is trigger control. This includes whether, when, and how to engage. It incorporates the Soldier as a function of safety, as well as the ultimate responsibility of firing the weapon.
140. How is movement demonstrated during the shot process?
    a. The process of the Soldier moving during the engagement process. It includes the Soldier's ability to move laterally, forward, diagonally, and in a retrograde manner while maintaining stabilization, appropriate aim, and control of the weapon.
141. How do movement, stability, control, and the aiming process affect the soldiers ability to hit their targets?
    a. Make adjustments to determine appropriate actions, and compensate for external influences on their shot process. When all elements are applied to the fullest extent, Soldiers will be able to rapidly engage targets with the highest level of precision.
142. What do time, target size, target distance, and the Soldier's skills and capabilities determine?
    a. The amount of effort required of each of the functional elements to minimize induced errors of the shot. Each weapon, tactical situation, and sight system will have preferred techniques for each step in the shot process and within the functional elements to produce precision and accuracy in a timely manner. How fast or slow the shooter progresses through the process is based on target size, target distance, and shooter capability.
143. How do soldiers develop their marksmanship capabilities?
    a. Soldiers and leaders must continue to refine skills and move training from the simplest shot to the most complex. Applying the functional elements during the shot process builds a firer's speed while maintaining consistency, accuracy, and precision during complex engagements.

144. What is target acquisition?
    a. The ability of a Soldier to rapidly recognize threats to the friendly unit or formation. It is a critical Soldier function before any shot process begins. It includes the Soldier's ability to use all available optics, sensors, and information to detect potential threats as quickly as possible.
145. Target acquisition requires the Soldier to apply an acute attention to detail in a continuous process based on the tactical situation. What are the components of target acquisition?
    a. Detect potential threats (target detection). Identify the threat as friend, foe, or noncombatant (target identification). Prioritize the threat(s) based on the level of danger they present (target prioritization).
146. Effective target detection requires a series of skills that Soldiers must master.
    a. Detection is an active process during combat operations with or without a clear or known
    b. threat presence.
147. All engagements are enabled by the Soldier's detection skills, and are built upon what three skill sets?
    a. Scan and search - a rapid sequence of various techniques to identify potential threats. Soldier scanning skills determine potential areas where threats are most likely to appear.
    b. Acquire - a refinement of the initial scan and search, based on irregularities in the environment.
    c. Locate - the ability to determine the general location of a threat to engage with accuracy or inform the small unit leader of contact with a potential threat.
148. Scanning and searching is the art of observing an assigned sector. What is the goal of scanning and searching?
    a. The goal of the scan and search is a deliberate detection of potential threats based on irregularities in the surrounding environment. This includes irregular shapes, colors, heat sources, movement, or actions the Soldier perceives as being "out of place," as compared to the surrounding area.
149. Soldiers use five basic search and scan techniques to detect potential threats in combat situations. What five search and scan techniques are commonly used?
    a. Rapid scan - used to detect obvious signs of threat activity quickly. It is usually the first method used, whether on the offense or fighting in the defense.
    b. Slow scan - if no threats are detected during the rapid scan, Soldiers conduct the more deliberate scan using various optics, aiming devices, or sensors. The slow scan is best conducted in the defense or during slow movement or tactical halts.
    c. Horizontal scan - are used when operating in restricted or urban terrain. It is a horizontal sweeping scan that focuses on key areas where potential threats may be over watching their movement or position.
    d. Vertical scan - an up and down scan in restricted or urban environments to
    e. identify potential threats that may be observing the unit from an elevated
    f. position.

g. Detailed search - used when no threats are detected using other scanning methods. The detailed search uses aiming devices, thermal weapon systems, magnified optics, or other sensors to slowly and methodically review
h. locations of interest where the Soldier would be positioned if they were the threat (where would I be if I were them?)

150. Target acquisition is the discovery of any object in the operational environment such as personnel, vehicles, equipment, or objects of potential military significance. When does this occur?
    a. Target acquisition occurs during target scan and search as a direct result of observation and the detection process. During the scan and search, Soldiers are looking for "target signatures," which are signs or evidence of a threat. Tactically, Soldiers will be looking for threat personnel, obstacles or mines (including possible improvised explosive devices [IEDs]), vehicles, or anti-tank missile systems. These target signatures can be identified with sight, sound, or smell.

151. Threat detection is a critical skill that requires thoughtful application of the sensors, optics, and systems at the Soldier's disposal. Why is this important?
    a. Finding potential threats as quickly and effectively as possible provides the maximum amount of time to defeat the threat.

152. What are some practices soldiers can use in order to increase target detection?
    a. Scan with the unaided eye first, then with a magnified optic.
    b. Practice using I2 and thermal optics in tandem during limited visibility.
    c. Understand the difference between I2 and thermal optics; what they can "see" and what they can't.
    d. Thermal optics are the preferred sight for target acquisition and engagement, day or night.
    e. Don't search in the same area as others in the small unit. Overlap, but do not focus on the same sector.
    f. Practice extreme light discipline during limited visibility including IR light discipline.
    g. Think as the threat. Search in areas that would be most advantageous from their perspective.
    h. Detecting threats is exponentially more difficult when operating in a chemical, biological, radiological, nuclear (CBRN) environment.
    i. Practice detection skills with personal protective equipment (PPE)/individual protective equipment (IPE) and understand the increased constraints and
    j. limitations, day and night.

153. How are targets located?
    a. Locating a target or series of targets occurs as a result of the search and acquisition actions of each Soldier in the small unit.

154. Identifying (or discriminating) a target as friend, foe, or noncombatant (neutral) is the second step in the target acquisition process. Threats are classified into what three categories?
    a. Friend. Any force, U.S. or allied, that is jointly engaged in combat operations with an enemy in a theater of operation.

b. Foe (enemy combatant). Any individual who has engaged acts against the U.S. or its coalition partners in violation of the laws and customs of war during an armed conflict.
c. Noncombatants. Personnel, organizations, or agencies that are not taking a direct part in hostilities. This includes individuals such as medical personnel, chaplains, United Nations observers, or media representatives or those out of combat such as the wounded or sick. Organizations like the Red Cross or Red Crescent can be classified as noncombatants.

155. The identification process is complicated by the increasing likelihood of having to discriminate between friend/foe and combatant/noncombatant in urban settings or restricted terrain. How can fratricide be mitigated?
a. To mitigate fratricide and unnecessary collateral damage, Soldiers use all of the situational understanding tools available and develop tactics, techniques, and procedures for performing target discrimination.
b. Units have other means of designating friendly vehicles from the enemy. Typically, these marking systems are derived from the unit tactical standard operating procedure (TACSOP) or other standardization publications, and applied to the personnel, small units, or vehicles as required:

156. How are unit markings defined?
a. Unit markings are defined within the unit SOP. They distinctly identify a vehicle as friendly in a standardized manner.

157. How do panels help friend and foe identifications?
a. VS-17 panels provide a bright recognition feature that allows Soldiers to identify friendly vehicles through the day sight during unlimited visibility. Panels do not provide a thermal signature.

158. How does lighting impact friend and foe identification?
a. Chemical or light emitting diode lights provide a means of marking vehicles at night. However, chemical lights are not visible through a thermal sight. An IR variant is available for use with night vision devices. Lighting systems do not provide for thermal identification during day or limited visibility operations. How do Beacons and Strobes impact friend and foe identification Beacons and strobes are unit-procured, small-scale, compact, battery-operated flashing devices that operate in the near infrared wavelength. They are clearly visibly through night vision optics, but cannot be viewed through thermal optics.

159. How do Symbols impact friend and foe identification?
a. Unit symbols may be used to mark friendly vehicles. An inverted V, for example, painted on the flanks, rear, and fronts of a vehicle, aid in identifying a target as friendly. These are typically applied in an area of operations and not during training. Symbol marking systems do not provide for thermal identification during day or limited visibility operations.

160. When faced with multiple targets, how do Soldiers prioritize each target and carefully plan his shots to ensure successful target engagement?
a. Mental preparedness and the ability to make split-second decisions are the keys to a successful engagement of multiple targets. The proper mindset will allow the

Soldier to react instinctively and control the pace of the battle, rather than reacting to the adversary threat.

161. What threats are considered most dangerous?
    a. A threat that has the capability to defeat the friendly force and is preparing to do so. These targets must be defeated immediately.
162. What threats are considered dangerous?
    a. A threat that has the capability to defeat the friendly force, but is not prepared to do so. These targets are defeated after all most dangerous targets are eliminated.
163. What threats are considered least dangerous?
    a. Any threat that does not have the ability to defeat the friendly force, but has the ability to coordinate with other threats that are more prepared. These targets are defeated after all threats of a higher threat level are defeated.
164. What is the standard prioritization of targets establishes the order of engagement?
    a. Firers engage similar threats by the following guide:
    b. Near before far.
    c. Frontal before flank.
    d. Stationary before moving.
165. The prioritization of targets provides a control mechanism for the shooter, and facilitates maintaining overmatch over the presented threats. When should soldiers deviate from the prioritization?
    a. Firers should be prepared to deviate from the prioritization guide based on the situation, collective fire command, or changes to the target's activities.
166. Stability is provided through four functions. What are they?
    a. support, muscle relaxation, natural point of aim, and recoil management. These functions provide the Soldier the means to best stabilize their weapon system during the engagement process.
167. Support can be natural or artificial or a combination of both. Where do natural and artificial support come from?
    a. Natural support comes from a combination of the shooter's bones and muscles. Artificial support comes from objects outside the shooter's body. The more support a particular position provides, the more stable the weapon.
168. How is leg position important for marksmanship?
    a. The position of the legs varies greatly depending on the firing position used. The position may require the legs to support the weight of the Soldier's body, support the firing elbow, or to meet other requirements for the firing position. When standing unsupported, the body is upright with the legs staggered and knees slightly bent. In the prone, the firer's legs may be spread apart flat on the ground or bent at the knee. In the sitting position, the legs may also serve an intricate part of the firing position.
169. What is the center of gravity?
    a. The physical position of a Soldier before, during, and after the shot that relates to the firer's balance and posture. The position/center of gravity does not apply when firing from the prone position. The position/center of gravity specifically

relates to the Soldier's ability to maintain the stable firing platform during firing, absorbing the recoil impulses, and the ability to aggressively lean toward the target area during the shot process.

170. How does Elbow Position factor into shooting?
    a. The placement of the firing elbow during the shot process. Proper elbow placement provides consistent firing hand grip while standing, sitting, or kneeling, and provides support stability in the prone position.
171. How does the non firing elbow factor into proper marksmanship?
    a. The Soldier's placement of the non firing elbow during the shot process supports the rifle in the all positions.
172. How does position of the firing factor into marksmanship?
    a. Proper placement of the firing hand will aid in trigger control. Place the pistol grip in the 'V' formed between the thumb and index finger. The pressure applied is similar to a firm handshake grip. Different Soldiers have different size hands and lengths of fingers, so there is no set position of the finger on the trigger. To grip the weapon, the Soldier places the back strap of the weapon's pistol grip high in the web of his firing side hand between his thumb and index (trigger) finger. The Soldier's trigger finger is indexed on the lower receiver, well outside the trigger guard and off the magazine release to prevent inadvertent release of the magazine. The firing hand thumb (or trigger finger for left-handed firers) is indexed on top of the safety selector switch. The Soldier grasps the pistol grip with his remaining three fingers ensuring there is no gap between his middle finger and the trigger guard.
173. How does placement of the non firing hand factor into marksmanship?
    a. Proper placement of the non-firing hand is based on the firing position and placement of the non-firing elbow to provide the stability of the weapon. Placement is adjusted during supported and unsupported firing to maximize stability. The non-firing hand is placed as far forward as comfortable without compromising the other elements of the position or inducing extreme shooter-gun angle.
174. What does the nonfiring hand support?
    a. The weight of the rifle by grasping the fore arm. It should be a firm but relaxed grip. In all positions it should be as close to the handguard as naturally possible to aid in recoil management
175. Why should the firer try to have the thumb over the top of the handguard when firing?
    a. The pressure will provide the necessary force to assist in the management of the muzzle rise from recoil.
176. In all positions the thumb should fit around what?
    a. Handguard as naturally possible to aid in recoil management. Due to limited space on current MWS rails the above may not be possible but consideration should be given while mounting lasers to achieve an extended grip.
177. Why is correct placement of the buttstock so important?
    a. Correct placement of the buttstock in the firing shoulder helps achieve solid stock weld.

178. The vertical placement of the butt stock will vary from firing position to firing position. A general guideline to follow is:
    a. the higher the position from the ground, the higher the butt stock will be in the shoulder.
179. What is stock weld?
    a. Stock weld is the placement of the firer's head on the stock of the weapon. Correct stock weld is critical to sight alignment. The firer rests the full weight of the head on the stock. The head position is as upright as possible to give the best vision through the aiming device. It allows for
    b. scanning additional targets not seen through the aiming device.
180. When establishing the stock weld, why should you bring the rifle up to your head, not your head down to the rifle?
    a. The firer's head will remain in the same location on the stock while firing, but the location may change when positions are changed. The bony portion of the cheek placed on the stokvis the basic starting point. Soldiers adapt to their facial structure to find the optimal placement that allows for both sight alignment and repetitive placement.
181. What is muscle relaxation?
    a. The ability of the soldier to maintain orientation of the weapon properly during the shot process while keeping the major muscle groups from straining to maintain the weapon system's position. Relaxed muscles contribute to stability provided by support. Strained or fatigued muscles detract from stability. As a rule, the more support from the shooter's bones the less he requires from his muscles. The more skeletal support, the more stable the position, as bones do not fatigue or strain. As a rule, the less muscle support required, the longer the shooter can stay in position.
182. The natural point of aim is the point where the barrel naturally orients when the shooter's muscles are relaxed and support is achieved. The natural point of aim is built upon what pinciples?
    a. The closer the natural point of aim is to the target, the less muscle support required.
    b. The more stable the position, the more resistant to recoil it is.
    c. More of the shooter's body on the ground equals a more stable position.
    d. More of the shooter's body on the ground equals less mobility for the shooter.
183. How does a lack of stability affect marksmanship?
    a. When a Soldier aims at a target, the lack of stability creates a wobble area, where the sights oscillate slightly around and through the point of aim. If the wobble area is larger than the target, the Soldier requires a steadier position or a refinement to their position to decrease the size of his wobble area before trigger squeeze.
184. How can you check a Soldier's natural point of aim?
    a. The Soldier should assume a good steady position and get to the natural pause. Close their eyes, go through one cycle, and then open their eyes on the natural pause. Where the sights are laying at this time, is the natural point of aim for that

position. If it is not on their point of aim for their target, they should make small adjustments to their position to get the reticle or front sight post back on their point of aim. The Soldier will repeat this process until the natural point of aim is on the point of aim on their target.

185. How does the soldier's firing position manage recoil?
    a. The Soldier's firing position manages recoil by using support of the weapon system, the weight of their body, and the placement of the weapon during the shot process. Proper recoil management allows the sights to rapidly return to the target and allows for faster follow up shots.
186. What is recoil management the result of?
    a. Soldier assuming and maintaining a stable firing position which mitigates the disturbance of one's sight picture during the cycle of function of the weapon.
187. What is the Shooter-Gun angle?
    a. The relationship between the shooters upper body and the direction of the weapon. This angle is typically different from firing position to firing position, and directly relates to the Soldier's ability to control recoil. Significant changes in the shooter-gun angle can result in eye relief and stock weld changes.
188. What is the field of view?
    a. The extent that the human eye can see at any given moment. The field of view is based on the Soldier's view without using magnification, optics, or thermal devices. The field of view is what the Soldier sees, and includes the areas where the Soldier can detect potential threats.
189. There are six primary carry positions. What are they?
    a. Hang.
    b. Safe hang.
    c. Collapsed low ready.
    d. Low ready.
    e. High ready.
    f. Ready (or ready-up).
190. When is the hang carry used?
    a. Soldiers use the hang when they need their hands for other tasks and no threat is present or likely (see figure 6-2). The weapon is slung and the safety is engaged. The hang carry should not be used when the weapon control status is RED. The reduced security of the weapon may cause the mechanical safety select lever to unintentionally move to SEMI or BURST/AUTO.
191. When is the safe hang used?
    a. When no immediate threat is present and the hands are not necessary. The weapon is slung, the safety is engaged, and the soldier has gripped the rifle's pistol grip. In this position, the Soldier can move in any direction while simultaneously maintaining his muzzle oriented at the ground by using his firing hand. This carry provides control of the weapon, flexibility in movement, and positive control of the weapon's fire controls.
192. When is the collapsed low ready used?

a. A greater degree of muzzle control and readiness to respond to threats or weapon retention is necessary (such as crowded environments). In the collapsed low ready, the firing hand is secure on the weapon's pistol grip. The non-firing hand is placed on the hand guards or vertical foregrip

193. What does the collapsed low ready allow you to do?
    a. Crowded or restrictive environments while simultaneously minimizing or eliminating his muzzle covering (flagging) by maintaining positive control of the muzzle orientation.
194. What does the low ready provide the highest level of?
    a. Readiness and with the maximum amount of observable area for target acquisition purposes
195. What are characteristics of the low ready positions?
    a. The weapon is slung, the butt stock is in the Soldier's shoulder, and the muzzle is angled down at a 30- to 45-degree angle and oriented towards the Soldier's sector of fire. Firing hand is positioned on the pistol grip with the index finger straight and out of the trigger guard. The thumb is placed on the selector lever with the lever placed on safe. From this carry, the Soldier is ready to engage threats within a very short amount of time with minimal movement.
196. When is the high ready used?
    a. The Soldier's sector of fire includes areas overhead or when an elevated muzzle orientation is appropriate for safety (see figure 6-6). The high ready carry is used when contact is likely.
197. What are some characteristics of the high ready?
    a. The weapon is slung, butt stock is in the armpit, the muzzle angled up to at least a 45-degree angle and oriented toward the Soldier's sector of fire—ensuring no other Soldiers are flagged.
198. Where does the firing hand remain in the high ready?
    a. Hands remain in the same position as the low ready. The non-firing side hand can be free as the weapon is supported by the firing side hand and armpit.
199. What are disadvantages of high ready?
    a. It impedes the field of view, flags friendlies above the sector of fire, and typically takes longer to acquire the target.
200. When is the ready used?
    a. When enemy contact is imminent (see figure 6-7). This carry is used when the Soldier is preparing or prepared to engage a threat. In the ready, the weapon is slung, the toe of the butt stock is in the Soldier's shoulder, and muzzle is oriented toward a threat or most likely direction of enemy contact. The Soldier is looking through his optics or sights. His non-firing side hand remains on the hand guards or the vertical foregrip.
201. The Soldier must stabilize their weapon,
    a. Whether firing from a stationary position or while on the move. To create a stabilized platform, Soldiers must understand the physical relationship between the weapon system, the shooter's body, the ground, and any other objects touching the weapon or shooter's body. The more contact the shooter has to the

ground will determine how stable and effective the position is. The situation and tactics will determine the actual position used.

202. What happens when a shooter assumes a stable firing position?
    a. Movement from muscle tension, breathing, and other natural activities within the body will be transferred to the weapon and must be compensated for by the shooter. Failing to create an effective platform to fire from is termed a stabilization failure.
203. A stabilization failure occurs when a Soldier fails to:
    a. Control the movement of the barrel during the arc of movement
    b. Adequately support the weapon system
    c. Achieve their natural point of aim.
204. These failures compound the firing occasion's errors,
    a. Which directly correlate to the accuracy of the shot taken. To maximize the Soldier's stability during the shot process, they correctly assume various firing positions when stationary, or offset the induced errors with other firing skills during tactical movement.
205. Why should soldiers practice shooting in a variety of different positions?
    a. The nature of combat will not always allow time for a Soldier to get into a particular position. Soldiers need to practice firing in a variety of positions, including appropriate variations. There are 12 firing positions with variations that are common to all Soldiers.
206. What are the two different standing positions?
    a. Standing, unsupported.
    b. Standing, supported.
207. What are some characteristics of the Squatting shooting positions?
    a. This position allows for rapid engagement of targets when an obstruction blocks the firer from using standard positions. It provides the firer a fairly well supported position by simply squatting down to engage, then returning to a standing position once the engagement is complete. The squatting position is generally unsupported.
208. Kneeling - The kneeling position is very common and useful in most combat situations. What are the two kneeling positions?
    a. Kneeling, unsupported.
    b. Kneeling, supported.
209. Sitting - All positions are easy to assume, present a medium silhouette, provide some body contact with the ground, and form a stable firing position. These positions allow easy access to the sights for zeroing. What are the three sitting positions?
    a. Sitting, crossed ankle.
    b. Sitting, crossed leg.
    c. Sitting, open leg.
210. Prone - The prone position is the most stable firing position due to the amount of the Soldier's body is in contact with the ground. The majority of the firer's frame is behind the rifle to assist with recoil management.. What are the four prone firing positions?
    a. Prone, unsupported.

b. Prone, supported.
c. Prone, roll-over.
d. Prone, reverse roll-over.

211. Why must soldiers practice working in different firing positions before shooting?
    a. They helped develop a point of aim for each position, and develop an understanding of the restrictive nature of their equipment during execution. With each dry repetition, the Soldier's ability to change positions rapidly and correctly are developed, translating into efficient movement and consistent stable firing positions.
212. When is the standing unsupported position used?
    a. This position should be used for closer targets or when time is not available to assume a steadier position such as short range employment. The upper body should be leaned slightly forward to aid in recoil management..
213. When is the standing supported position used?
    a. Soldier should ensure it is the handguard of the weapon NOT the barrel that is in contact with the artificial support. Barrels being in direct contact with artificial support will result in erratic shots. The standing supported position uses artificial support to steady the position (see figure 6-10.) Forward pressure should be applied by the rear leg and upper body to aid in recoil management.
214. The key focus area for the standing supported position are applied in what ways?
    a. Nonfiring hand. The nonfiring hand will hold the hand guards firmly and push against the artificial support. Hand positioning will vary depending on the type of support used.
215. What does the squatting firing position allow soldiers to do?
    a. This position allows for rapid engagement of targets when an obstruction blocks the firer from using standard positions. It allows the firer a fairly stable position by simply squatting down to engage, then returning to a standing position after completing the engagement
216. What can you do to assume a good squatting firing position?
    a. Face the target.
    b. Place the feet shoulder-width apart.
    c. Squat down as far as possible.
    d. Place the back of triceps on the knees ensuring there is no bone on bone contact.
    e. Place the firing hand on the pistol grip and the nonfiring hand on the upper hand guards.
    f. Place the weapon's butt stock high in the firer's shoulder pocket.
217. What does the kneeling unsupported position not use?
    a. Artificial support. The firer should be leaning slightly forward into the position to allow for recoil management and quicker follow-up shots. The primary goal of this firing position is to establish the smallest wobble area possible.
218. What are the key focus areas for kneeling, unsupported shooting positions?
    a. Nonfiring elbow. Place the non-firing elbow directly underneath the rifle as much as possible. The elbow should be placed either in front of or behind the kneecap.

Placing the elbow directly on the kneecap will cause it to roll and increases the wobble area.

b. Leg position. The non-firing leg should be bent approximately 90 degrees at the knee and be directly under the rifle. The firing-side leg should be perpendicular to the nonfiring leg. The firer may rest their body weight on the heel. Some firers lack the flexibility to do this and may have a gap between their buttocks and the heel.

219. What are the differences between supported and unsupported firing positions?
    a. Contact by the nonfiring hand and elbow with the artificial support is the primary difference between the kneeling supported and unsupported positions since it assists in the stability of the weapon. Body contact is good, but the barrel of the rifle must not touch the artificial support. Forward pressure is applied to aid in recoil management.
220. What are key focus areas for the kneeling supported position?
    a. Nonfiring hand. The nonfiring hand will hold the hand guards firmly and will also be pushed against the artificial support. Hand positioning will vary depending on the type of support used.
    b. Nonfiring elbow. The nonfiring elbow and forearm may be used to assist with the weapon's stability by pushing against the artificial support. The contact of the nonfiring elbow and forearm with the structure will vary depending on the support used and the angle to the target.
221. What are some key focus areas to assume a good crossed-ankle position?
    a. Face the target at a 10- to 30-degree angle.
    b. Place the nonfiring hand under the hand guard.
    c. Bend at knees and break fall with the firing hand.
    d. Push backward with feet to extend legs and place the buttocks to ground.
    e. Cross the non-firing ankle over the firing ankle.
    f. Bend forward at the waist.
    g. Place the non-firing elbow on the nonfiring leg below knee.
    h. Grasp the rifle butt with the firing hand and place into the firing shoulder pocket.
    i. Grasp the pistol grip with the firing hand.
    j. Lower the firing elbow to the inside of the firing knee.
    k. Place the cheek firmly against the stock to obtain a firm stock weld.
    l. Move the nonfiring hand to a location under the hand guard that provides the maximum bone support and stability for the weapon.
    m. What does the crossed-leg sitting position provide? A base of support and places most of the body weight behind the weapon for quick shot recovery
    n. Soldiers may experience a strong pulse beat in this position due to restricted blood flow in the legs
    o. and abdomen. An increased pulse causes a larger wobble area.
222. How do you assume a good crossed-leg position?
    a. Place the nonfiring hand under the hand guard.
    b. Cross the nonfiring leg over the firing leg.
    c. Bend at the knees and break the fall with the firing hand.

d. Place the buttocks to the ground close to the crossed legs.
e. Bend forward at the waist.
f. Place the nonfiring elbow on the nonfiring leg at the bend of the knee.
g. Establish solid butt stock position in the firing shoulder pocket.
h. Grasp the pistol grip with the firing hand.
i. Lower the firing elbow to the inside of the firing knee.
j. Place the cheek firmly against the stock to obtain a firm stock weld.
k. Place the non-firing hand under the hand guard to provide support.

223. When is the open-leg sitting position is the preferred sitting position?
    a. Shooting with combat equipment (see figure 6-16). It places less of the body weight behind the weapon than the other sitting positions.

224. What is reverse roll over prone shooting position and when should it be used?
    a. This position is primarily used when the firer needs to keep behind cover that is too low to use while in a traditional prone position (see figure 6-20). The bullet's trajectory will be off considerably at long distances while in this position. This position is the most effective way to support the weapon when the traditional prone is too low to be effective and where a kneeling position is too high to gain cover or a solid base for support.

225. What is the Aiming process?
    a. Continuous process of orienting the weapon correctly, aligning the sights, aligning on the target, and the application of the appropriate lead and elevation during a target engagement. Aiming is a continuous process conducted through pre-shot, shot, and post-shot, to effectively apply lethal fires in a responsible manner with accuracy and precision.

226. Aiming is the application of perfectly aligned sights on a specific part of a target. What is the most important part of this process?
    a. Sight alignment is the first and most important part of this process.

227. The aiming process for engaging stationary targets consist of what actions?
    a. Weapon orientation - the direction of the weapon as it is held in a stabilized manner.
    b. Sight alignment - the physical alignment of the aiming device:
    c. Iron sight/back-up iron sight and the front sight post.
    d. Optic reticle.
    e. Ballistic reticle (day or thermal).
    f. Sight picture - the target as viewed through the line of sight.
    g. Point of aim (POA) - the specific location where the line of sight intersects the target.
    h. Desired point of impact (POI)-the desired location of the strike of the round to achieve the desired outcome (incapacitation or lethal strike).

228. The aim of the weapon is typically applied to the largest, most lethal area of any target presented. Sights can be placed on target by using battlesight zero (BZ), center of visible mass (CoVM). What is center of visible mass?
    a. The center of visible mass is the initial point of aim on a target of what can be seen by the Soldier. It does not include what the target size is expected or

anticipated to be. For example, a target located behind a car exposes its head. The center of visible mass is in the center of the head, not the estimated location of the center of the overall target behind the car.

229. The Soldier orients the weapon in the direction of the detected threat. What is the process of weapon orientation?
    a. Weapon orientation includes both the horizontal plane (azimuth) and the vertical plane (elevation). Weapon orientation is complete once the sight and threat are in the Soldier's field of view.
230. What does horizontal weapons orientation cover?
    a. The frontal arc of the Soldier, spanning the area from the left shoulder, across the Soldier's front, to the area across the right shoulder (see figure 7-1).
231. What does vertical weapons orientation cover?
    a. Includes all the aspects of orienting the weapon at a potential or confirmed threat in elevation. This is most commonly applied in restricted, mountainous, or urban terrain where threats present themselves in elevated or depressed firing positions
232. What is sight alignment?
    a. Sight alignment is the relationship between the aiming device and the firer's eye.
    b. The process used by a Soldier depends on the aiming device employed with the weapon.
233. What is considered proper sight alignment while using Iron sights?
    a. The relationship between the front sight post, rear sight aperture, and the firer's eye. The firer aligns the tip of the front sight post in the center of the rear aperture and his/or her eye. The firer will maintain focus on the front sight post, simultaneously centering it in the rear aperture.
234. What is considered proper sight alignment while using Optics?
    a. The relationship between the reticle and the firer's eye and includes the appropriate eye relief, or distance of the Soldier's eye from the optic itself. Ensure the red dot is visible in the CCO, or a full centered field of view is achieved with no shadow on magnified optics
235. The human eye can only focus clearly on one object at a time. How can soldiers achieve proper aim despite this?
    a. To achieve proper and effective aim, the focus of the firer's eye needs to be on the front sight post or reticle (see figure 7-3). This provides the most accurate sight alignment for the shot process.
236. How do shooters achieve consistent sight alignment?
    a. Firers achieve consistent sight alignment by resting the full weight of their head on the stock in a manner that allows their dominant eye to look through the center of the aiming or sighting device. If the firer's head placement is subjected to change during the firing process or between shots, the Soldier will experience difficultly achieving accurate shot groups.

237. What is sight picture and why is it important?
    a. The sight picture is the placement of the aligned sights on the target itself.
    b. The Soldier must maintain sight alignment throughout the positioning of the sights. This is not the same as sight alignment.
238. There are two sight pictures used during the shot process; pre-shot and post-shot. What is the difference between these two sight pictures?
    a. Pre-shot sight picture - encompasses the original point of aim, sight picture, and any holds for target or environmental conditions.
    b. Post-shot sight picture - is what the Soldier must use as the point of reference for any sight adjustments for any subsequent shot.
239. What is point of aim?
    a. The point on the target that is the continuation of the line created by sight alignment. The point of aim is a point of reference used to calculate any hold the Soldier deems necessary to achieve the desired results of the round's impact. For engagements against stationary targets, under 300 meters, with negligible wind, and a weapon that has a 200 meter or 300 meter confirmed zero, the point of aim should be the center of visible mass of the target. The point of aim does not include ANY hold-off or lead changes necessary.
240. What is the desired point of impact?
    a. The desired point of impact is the location where the Soldier wants the projectile to strike the target. Typically, this is the center of visible mass. At any range different from the weapon's zero distance, the Soldier's desired point of impact and their point of aim will not align. This requires the Soldier to determine the necessary hold-off to achieve the desired point of impact.
241. Orienting and aiming a weapon correctly is a practiced skill. How do soliders develop mastery of these skills?
    a. Through drills and repetitions, Soldiers build the ability to repeat proper weapons orientation, sight alignment, and sight picture as a function of muscle memory.
242. How does eye dominance factor into effective marksmanship?
    a. The Soldier gets the greatest amount of visual input from their dominant eye. Eye dominance varies Soldier to Soldier. Some Soldier's dominant eye will be the opposite of the dominant hand. For example, a Soldier who writes with his right hand and learns to shoot rifles right handed might learn that his dominant eye is the left eye. This is called cross-dominant. Soldiers with strong cross-dominant eyes should consider firing using their dominant eye side while firing from their non-dominant hand side. Soldiers can be trained to fire from either side of the weapon, but may not be able to shoot effectively using their nondominant eye.
243. How does an incorrect zero affect marksmanship?
    a. Regardless of how well a Soldier aims, if the zero is incorrect, the round will not travel to the desired point of impact without adjustment with subsequent rounds (see appendix C of this publication).
244. How do light conditions affect marksmanship?
    a. Limited visibility conditions contribute to errors aligning the sight, selecting the correct point of aim, or determining the appropriate hold. Soldiers may offset the

effects of low light engagements with image intensifier (I2) optics, use of thermal optics, or the use of laser pointing devices with I2 optics.

245. How do battlefield obscurants affect marksmanship?
    a. Smoke, debris, and haze are common conditions on the battlefield that will disrupt the Soldier's ability to correctly align their sights, select the proper point of aim, or determine the correct hold for a specific target.
246. When will soldiers experience Incorrect sight alignment?
    a. Soldiers may experience this error when failing to focus on the front sight post or reticle.
247. When does Incorrect sight picture occur?
    a. Occurs typically when the threat is in a concealed location, is moving, or sufficient winds between the shooter and target exist that are not accounted for during the hold determination process. This failure directly impacts the Soldier's ability to create and sustain the proper sight picture during the shot process.
248. How does Improper range determination affect marksmanship?
    a. Will result in an improper hold at ranges greater than the zeroed range for the weapon.
249. What is considered a complex engagement?
    a. A complex engagement includes any shot that cannot use the CoVM as the point of aim to ensure a target hit. Complex engagements require a Soldier to apply various points of aim to successfully defeat the threat. These engagements have an increased level of difficulty due to environmental, target, or shooter conditions that create a need for the firer to rapidly determine a ballistic solution and apply that solution to the point of aim.
250. What are factors that contribute to increased engagement difficulty?
    a. range to target
    b. moving targets
    c. oblique targets
    d. evasive targets
    e. limited exposure targets
    f. wind
    g. angled firing
    h. limited visibility
    i. moving firing position
    j. canted weapon engagements
    k. CBRN operations
251. What are factors that shooters need to determine when making holds for a complex engagement?
    a. Range to target.
    b. Lead for targets based on their direction and speed of movement.
    c. Counter-rotation lead required when the Soldier is moving in the opposite direction of the moving target.
    d. Wind speed, direction, and duration between the shooter and the target at ranges greater than 300 meters.

e. Greatest lethal zone presented by the target to provide the most probable point of impact to achieve immediate incapacitation.

252. What does a hold represent?
    a. A refinement or alteration of the center of visible mass point of aim at the target to counteract certain conditions during a complex engagement The Soldier will apply the appropriate aim (hold) based on the firing instances presented. All Soldiers must be familiar with the immediate hold determination methods. They should be naturally applied when the engagement conditions require. These determinations are provided in "target form" measurements, based on a standard E-type silhouette dimension, approximately 20 inches wide by 40 inches tall.

253. What are the two forms of hold determinations?
    a. Immediate and deliberate.

254. What are immediate holds based on? What are immediate holds meant for?
    a. Immediate holds are based on the values of a "target form," where the increments shown are sufficient for rapid target hits without ballistic computations. The immediate hold determinations are not as accurate as the deliberate method, and are used for complex target engagements at less than 300 meters.

255. What are deliberate hold points of aim derived from?
    a. Applying the appropriate ballistic math computation. Deliberate hold determinations are required for precise shots beyond 300 meters for wind, extended range, moving, oblique, or evasive targets.
    b. Soldiers must consider several aspects of the target to apply the proper point of aim on the target.

256. What three things determine how targets present themselves to shooters?
    a. Range to target.
    b. Nature of the target.
    c. Nature of the terrain (surrounding the target).

257. Rapidly determining an accurate range to target is critical to the success of the Soldier at mid and extended ranges. What methods can be used to determine target range?
    a. There are several range determination methods shooters should be confident in applying to determine the proper hold-off for pending engagements. There are two types of range determination methods, immediate and deliberate.

258. The immediate methods include:
    a. Close quarters engagements. Laser range finder. Front sight post method. Recognition method. 100-meter unit-of-measure method.

259. When are short-range engagements probable?
    a. In engagement ranges typically less than 50 meters. Soldiers must be confident in their equipment, zero, and capabilities to defeat the threats encountered.

260. What is critical for the accurate engagement of targets at close range?
    a. At close ranges, perfect sight alignment is not as critical to the accurate engagement of targets. The weapon is presented rapidly and the shot is fired

with the front sight post placed roughly center mass on the desired target area. The front sight post must be in the rear sight aperture.

261. How can Laser Range Finders be used for range determination?
    a. Equipment like the AN/PSQ-23, STORM have an on-board laser range finder that is accurate to within +/- 5 meters. Soldiers with the STORM attached can rapidly determine the most accurate range to target and apply the necessary hold-offs to ensure the highest probability of incapacitation, particularly at extended ranges.

262. The area of the target that is covered by the front sight post of the rifle can be used to estimate range to the target. How can you use the front sight post to determine engagement distance?
    a. By comparing the appearance of the rifle front sight post on a target at known distances, your shooters can establish a mental reference point for determining range at unknown distances. Because the apparent size of the target changes as the distance to the target changes, the amount of the target that is covered by the front sight post will vary depending upon its range. In addition, your shooter's eye relief and perception of the front sight post will also affect the amount of the target that is visible

263. How should you use the front sight post for range determination when the target is less Than 300 Meters?
    a. If the target is wider than the front sight post, you can assume that the target is less than 300 meters and can be engaged point of aim/point of impact using your battle sight zero.

264. How should you use the front sight post for range determination when the target is greater than 300 Meters?
    a. The service rifle front sight post covers the width of a man's chest or body at approximately 300 meters. If the target is less than the width of the front sight post, you should assume the target is in excess of 300 meters. Therefore, your BZO cannot be used effectively.

265. When observing a target, does the amount of detail seen at various ranges gives the shooter a solid indication of the range to target?
    a. Yes. Shooters should study and remember the appearance of a person when they are standing at 100 meters increments. During training, Soldiers should note the details of size and the characteristics of uniform and equipment for targets at those increments.

266. Once Soldiers are familiar and memorize the characteristics of standing threats at 100 meter increments out to 500 meters, they should study the targets in a kneeling and then in the prone position.How does the process of memorizing the characteristics of targets at specific ranges aid in range estimation?
    a. By comparing the appearance of these positions at known ranges from 100 meters to 500 meters, shooters can establish a series of mental images that will help determine range on unfamiliar terrain. They should also study the appearance of other familiar objects such as weapons and vehicles.

267. What characteristics can be determined at 100 meters?
    a. the target can be clearly observed in detail, and facial features can be distinguished.
268. What characteristics can be determined at 200 meters?
    a. the target can be clearly observed, although there is a loss of facial detail. The color of the skin and equipment is still identifiable.
269. What characteristics can be determined at 300 meters?
    a. the target has a clear body outline, face color usually remains accurate, but remaining details are blurred.
270. What characteristics can be determined at 400 meters?
    a. the body outline is clear, but remaining detail is blurred.
271. What characteristics can be determined at 500 meters?
    a. the body shape begins to taper at the ends. The head becomes indistinct from the shoulders.
272. To determine the total distance to the target using the 100 meter unit of measure method, what must shooters do?
    a. visualize a distance of 100 meters (generally visualizing the length of a football field) on the ground. Soldiers then estimate how many of these units can fit between the shooter and the target.
273. What is the biggest limitation for the unit of measure method?
    a. its accuracy is directly related to how much of the terrain is visible. This is particularly true at greater ranges. If a target appears at a range of 500 meters or more and only a portion of the ground between your shooter and the target can be seen, it becomes difficult to use the unit of measure method of range estimation with accuracy.
274. What are Immediate range determination holds based on?
    a. The zero of the weapon. The 300 meter zero is the Army standard and works in all tactical situations, including close quarters combat.
275. Moving targets are those threats that appear to have a consistent pace and direction. Targets on any battlefield will not remain stationary for long periods of time, particularly once a firefight begins. Why is it important for soldiers to be able to accurately engage moving targets?
    a. Soldiers must have the ability to deliver lethal fires at a variety of moving target types and be comfortable and confident in the engagement techniques. There are two methods for defeating moving targets; tracking and trapping.
276. What is the immediate hold for moving targets?
    a. The immediate hold for moving targets includes an estimation of the speed of the moving target and an estimation of the range to that target. The immediate holds for all moving targets are shown below.
277. What are threats that are moving diagonally toward or away from the shooter called?
    a. Oblique targets. They offer a unique problem set to shooters where the target may be moving at a steady pace and direction; however, their oblique direction of travel makes them appear to move slower.
278. What should soldiers adjust their hold based on?

a. The angle of the target's movement from the gun-target line.

279. What is the most common variable and has the greatest effect on projectiles?
    a. Wind affects ballistic trajectories, where it physically pushes the projectile during flight off the desired trajectory (see appendix B of this publication). The effects of wind can be compensated for by the shooter provided they understand how wind effects the projectile and the terminal point of impact.

280. What are the elements of wind effects?
    a. The time the projectile is exposed to the wind (range).
    b. The direction from which the wind is blowing.
    c. The velocity of the wind on the projectile during flight.

281. How does wind affect the flight path of bullets?
    a. Winds from the left blow the projectile to the right, and winds from the right blow the projectile to the left. The amount of the effect depends on the time of (projectile's exposure) the wind speed and direction. To compensate for the wind, the firer must first determine the wind's direction and value.

282. What is the value of the wind refer to? What affect does it have on a bullet's flight path?
    a. The value of the wind is how much effect the wind will have on the projectile. Winds from certain directions have less effect on projectiles. The chart below shows that winds from 2 to 4°o'clock and 8 to 10 o'clock are considered full-value winds and will have the most effect on the projectile. Winds from 1, 5, 7, and 11 o'clock are considered half-value winds and will have roughly half the effect of a full-value wind. Winds from 6 and 12°o'clock are considered no-value winds and little or no effect on the projectile.

283. How is wind speed determined?
    a. Wind speed can be determined by taking an average of the winds blowing on the range.
    b. The firer's focus should be on the winds between the midrange point and the target. The wind at the one half to two thirds mark will have the most effect on the projectile since that is the point where most projectiles have lost a large portion of their velocity and are beginning to destabilize. The Soldier can observe the movement of items in the environment downrange to determine the speed. Each environment will have different vegetation that reacts differently.

284. What do downrange wind indicators include?
    a. 0 to 3 mph = Hardly felt, but smoke drifts.
    b. 3 to 5 mph = Felt lightly on the face.
    c. 5 to 8 mph = Keeps leaves in constant movement.
    d. 8 to 12 mph = Raises dust and loose paper.
    e. 12 to 15 mph = Causes small trees to sway.

285. To estimate the effects of the wind on the shot, Soldiers need to determine what three windage factors?
    a. Velocity (speed).
    b. Direction.
    c. Value.

286. What is the Immediate Wind Hold?
    a. Using a hold involves changing the point of aim to compensate for the wind drift. For example, if wind causes the bullet to drift 1/2 form to the left, the aiming point must be moved 1/2 form to the right. Limited visibility conditions may limit the viewable size of a threat, or cause targets to be lost after acquisition. In these situations, Soldiers may choose to apply a hold for where a target is expected to be rather than wait for the target to present itself for a more refined reticle lay or sight picture.
287. Soldiers may switch between optics, thermals, and pointers to refine their point of aim. What must the solider do to rapidly switch between aiming devices during operations in limited visibility?
    a. The Soldier must ensure accurate alignment, boresighting, and zeroing of all associated
    b. Equipment. Confidence in the equipment is achieved through drills related to changing the aiming device during engagements, executing repetitions with multiple pieces of equipment, and practicing nonstandard engagement techniques using multiple aiming devices in tandem
288. Regardless of how well trained or physically strong a Soldier is, a wobble area (or arc of movement) is present, even when sufficient physical support of the weapon is provided. How are arcs of movement observed in shooters?
    a. The arc of movement (AM) may be observed as the sights moving in a W shape, vertical (up and down) pulses, circular, or horizontal arcs depending on the individual Soldier, regardless of their proficiency in applying the functional elements. The wobble area or arc of movement is the extent of lateral horizontal and front-to-back variance in the movement that occurs in the sight picture
289. The Soldier physically maintains positive control of the shot process by managing what factors?
    a. Trigger control.
    b. Breathing control.
    c. Workspace.
    d. Calling the shot (firing or shot execution).
    e. Follow-through.
290. What is trigger control?
    a. Trigger control is the act of firing the weapon while maintaining proper aim and adequate stabilization until the bullet leaves the muzzle. Trigger control and the shooter's position work together to allow the sights to stay on the target long enough for the shooter to fire the weapon and bullet to exit the barrel.
291. Stability and trigger control complement each other and are integrated during the shot process. How are they integrated in the shot process?
    a. A stable position assists in aiming and reduces unwanted movements during trigger squeeze without inducing unnecessary movement or disturbing the sight picture. A smooth, consistent trigger squeeze, regardless of speed, allows the shot to fire at the Soldier's moment of choosing. When both a solid position and a

good trigger squeeze are achieved, any induced shooting errors can be attributed to the aiming process for refinement.

292. How can a shooter achieve proper trigger control?
    a. Smooth trigger control is facilitated by placing the finger where it naturally lays on the trigger.
    b. Natural placement of the finger on the trigger will allow for the best mechanical advantage when applying rearward pressure to the trigger.
293. What are important considerations for proper trigger finger placement?
    a. The trigger finger will lay naturally across the trigger after achieving proper grip.There is no specified point on the trigger finger that must be used. It will not be the same for all Soldiers due to different size hands. This allows the Soldier to engage the trigger in the most effective manner
294. How does a solider achieve proper trigger squeeze?
    a. The Soldier pulls the trigger in a smooth consistent manner adding pressure until the weapon fires. Regardless of the speed at which the Soldier is firing the trigger control will always be smooth.
295. During the shot process, the shooter controls their breathing to reduce the amount of movement of the weapon. How can soldiers learn to properly manage their breathing patterns while shooting?
    a. During training, the Soldier will learn a method of breathing control that best suits their shooting style and preference. Breathing control is the relationship of the respiratory process (free or under stress) and the decision to execute the shot with trigger squeeze.
296. How does breathing affect accurate fires?
    a. Breathing induces unavoidable body movement that contribute to wobble or the arc of movement (AM) during the shot process. Soldiers cannot completely eliminate all motion during the shot process, but they can significantly reduce its effects through practice and technique. Firing on the natural pause is a common technique used during grouping and zeroing.
297. Vertical dispersion during grouping is most likely caused by what?
    a. Breathing
298. What is the workspace?
    a. The workspace is a spherical area, 12 to 18 inches in diameter centered on the Soldier's chin and approximately 12 inches in front of their chin. The workspace is where the majority of weapons manipulations take place.
299. How does use of the workspace allow for more efficient weapon manipulation?
    a. Conducting manipulations in the workspace allows the Soldier to keep his eyes oriented towards a threat or his individual sector of fire while conducting critical weapons tasks that require hand and eye coordination. Use of the workspace creates efficiency of motion by minimizing the distance the weapon has to move between the firing position to the workspace and return to the firing position.

300. Location of the workspace will change slightly in different firing positions. What are some different examples of the workspace?
    a. There are various techniques to use the workspace. Some examples are leaving the butt stock in the shoulder, tucking the butt stock under the armpit for added control of the weapon, or placing the butt stock in the crook of the elbow.
301. Workspace management includes the Soldier's ability to perform what functions?
    a. Selector lever - to change the weapon's status from safe to semiautomatic, to burst/automatic from any position.
    b. Charging handle - to smoothly use the charging handle during operation. This includes any corrective actions to overcome malfunctions, loading, unloading, or clearing procedures.
    c. Bolt catch - to operate the bolt catch mechanism on the weapon during
    d. operations.
    e. Ejection port - closing the ejection port cover to protect the bolt carrier assembly, ammunition, and chamber from external debris upon completion of an engagement. This includes observation of the ejection port area during
    f. malfunctions and clearing procedures.
    g. Magazine catch - the smooth functioning of the magazine catch during reloading procedures, clearing procedures, or malfunction corrective actions.
    h. Chamber check - the sequence used to verify the status of the weapon's chamber.
    i. Forward assist - the routine use of the forward assist assembly of the weapon during loading procedures or when correcting malfunctions.
302. Why is knowing precisely where the sights are when the weapon discharges critical for shot analysis?
    a. Errors such as flinching or jerking of the trigger can be seen in the sights before discharge.
303. The shooter is responsible for the point of impact of every round fired from their weapon. What does this mean?
    a. This requires the Soldier to ensure the target area is clear of friendly and neutral actors, in front of and behind the target. Soldiers must also be aware of the environment the target is positioned in, particularly in urban settings—friendly or neutral actors may be present in other areas of a structure that the projectile can pass through.
304. What is considered slow semiautomatic fire?
    a. Slow semiautomatic fire is moderately paced at the discretion of the Soldier, typically used in a training environment or a secure defensive position at approximately 12 to 15 rounds per minute. All Soldiers learn the techniques of slow semiautomatic fire during their introduction to the service rifle during initial entry training. This type of firing provides the Soldier the most time to focus on the functional elements in the shot process and reinforces all previous training.
305. What is rapid semiautomatic fire?
    a. Rapid semiautomatic fire is approximately 45 rounds per minute and is typically

b. used for multiple targets or combat scenarios where the Soldier does not have overmatch of the threat. Soldiers should be well-trained in all aspects of slow semiautomatic firing before attempting any rapid semiautomatic fire training. Those who display a lack of knowledge of employment skills should not advance to rapid semiautomatic fire training until these skills are learned and mastered.

306. What is automatic or burst fire?
    a. Automatic or burst fire is when the Soldier is required to provide suppressive fires with accuracy, and the need for precise fires, although desired, is not as important. Automatic or burst fires drastically decrease the probability of hit due to the rapid succession of recoil impulses and the inability of the Soldier to maintain proper sight alignment and sight picture on the target. Soldiers should be well-trained in all aspects of slow semiautomatic firing before attempting any automatic training.
307. What is follow through?
    a. Follow-through is the continued mental and physical application of the functional elements of the shot process after the shot has been fired.
    b. The firer's head stays in contact with the stock, the firing eye remains open, the trigger finger holds the trigger back through recoil and then lets off enough to reset the trigger, and the body position and breathing remain steady.
308. What is recoil management?
    a. This includes the bolt carrier group recoiling completely and returning to battery.
309. What is recoil cover?
    a. Returning to the same pre-shot position and reacquiring the sight picture. The shooter should have a good sight picture before and after the shot.
310. What occurs during Trigger/Sear reset?
    a. Once the ejection phase of the cycle of function is complete, the weapon initiates and completes the cocking phase. As part of the cocking phase, all mechanical components associated with the trigger, disconnect, and sear are reset. Any failures in the cocking phase indicate a weapon malfunction and require the shooter to take the appropriate action. The shooter maintains trigger finger placement and releases pressure on the trigger until the sear is reset, demonstrated by a metallic click. At this point the sear is reset and the trigger pre-staged for a subsequent or supplemental engagement if needed.
    b. Sight picture adjustment. Counteracting the physical changes in the sight picture
    c. caused by recoil impulses and returning the sight picture onto the target aiming point.
311. What is an engagement assessment?
    a. Once the sight picture returns to the original point of aim, the fire confirms the strike of the round, assesses the target's state, and immediately selects one of the following courses of action:
    b. Subsequent engagement
    c. Supplemental engagement
    d. Sector check
    e. Correct Malfunction

312. What does subsequent engagement mean?
    a. The target requires additional (subsequent) rounds to achieve the desired target effect. The shooter starts the pre- shot process.
313. What does Supplemental engagement mean?
    a. The shooter determines the desired target effect is achieved and another target may require servicing. The shooter starts the pre-shot process.
314. What does Sector check mean?
    a. All threats have been adequately serviced to the desired effect. The shooter then checks his sector of responsibility for additional threats as the tactical situation dictates. The unit's SOP will dictate any vocal announcements required during the post-shot sequence.
315. When any weapon fails to complete any phase of the cycle of function correctly, a malfunction has occurred. What actions should take place when this happens?
    a. When a malfunction occurs, the Soldier's priority remains to defeat the target as quickly as possible. The malfunction, Soldier capability, and secondary weapon capability determine if, when, and how to transition to a secondary weapon system.
316. The Soldier controls which actions must be taken to ensure the target is defeated as quickly as possible based on what criteria?
    a. Secondary weapon availability and capability, and the level of threat presented by the range to target and its capability
317. What happens when a secondary weapon can defeat the threat?
    a. Soldier transitions to a secondary weapon for the engagement. If no secondary weapon is available, announce their status to the small team, and move to a covered position to correct the malfunction.
318. What happens when a secondary weapon cannot defeat the threat?
    a. Soldiers quickly move to a covered position, announce their status to the small team, and execute corrective action.
319. What happens when there is no secondary weapon?
    a. Soldiers quickly move to a covered position, announce their status to the small team, and execute corrective action.
320. What is the end state for any corrective action?
    a. Typically, the phase where the malfunction occurred within the cycle of function identifies the general problem that must be corrected. From a practical, combat perspective, malfunctions are recognized by their symptoms. Although some symptoms do not specifically identify a single point of failure, they provide the best indication on which corrective action to apply.
321. To overcome the malfunction, the Soldier must first avoid what?
    a. Over analyzing the malfunction. The Soldier must train to execute corrective actions immediately without hesitation or investigation during combat conditions.

322. What is immediate action?
    a. Simple, rapid actions or motions taken by the Soldier to correct basic disruptions in the cycle of function of the weapon. Immediate action is taken when a malfunction occurs such that the trigger is squeeze and the hammer falls with an audible "click."
323. What is remedial action?
    a. A skilled, technique that must be applied to a specific problem or issue with the weapon that will not be corrected by taking immediate action. Remedial action is taken when the cycle of function is interrupted where the trigger is squeezed and either has little resistance during the squeeze ("mush") or the trigger cannot be squeezed.
324. What is considered a failure to fire?
    a. Is when a round is locked into the chamber, the weapon is ready to fire, the select switch is placed on SEMI or BURST / AUTO, and the trigger is squeezed, the hammer falls (audible click), and the weapon does not fire.
325. What is considered a failure to feed?
    a. When the bolt carrier assembly is expected to move return back into battery but is prevented from moving all the way forward. A clear gap can be seen between the bolt carrier assembly and the forward edge of the ejection port. This failure may cause a stove pipe or a double feed
326. What is considered a failure to chamber?
    a. When the round is being fed into the chamber, but the bolt carrier assembly does not fully seat forward, failing to chamber the round and lock the bolt locking lugs with the barrel extension's corresponding lugs.
327. What is considered a failure to extract?
    a. When either automatically or manually, the extractor loses its grip on the cartridge case or the bolt seizes movement rearward during extraction that leaves the cartridge case partially removed or fully seated.
328. What is considered a failure to eject?
    a. Occurs when, either automatically or manually, a cartridge case is extracted from the chamber fully, but does not leave the upper receiver through the ejection port.
329. Remedial action requires the Soldier to do what?
    a. Quickly identify one of four issues and apply a specific technique to correct the malfunction.
330. When immediate action fails to correct symptom?
    a. When a malfunction occurred that initiated the Soldier to execute immediate action and multiple attempts failed to correct the malfunction. A minimum of two cycles of immediate action should have been completed; first, without a magazine change, and the second with a magazine change.
331. What is a stove pipe?
    a. Can occur when either a feeding cartridge or an expended cartridge case is pushed sideways during the cycle of function causing that casing to stop the forward movement of the bolt carrier assembly and lodge itself between the face of the bolt and the ejection port.

332. What is a double feed?
    a. Occurs when a round is chambered and not fired and a subsequent round is being fed without the chamber being clear.
333. What is a bold override?
    a. When the bolt fails to push a new cartridge out of the magazine during feeding or chambering, causing the bolt to ride on top of the cartridge.
334. What is charging handle impingement?
    a. When a round becomes stuck between the bolt assembly and the charging handle where the charging handle is not in the forward, locked position.
335. To perform immediate action, the Soldier instinctively:
    a. Hears the hammer fall with an audible "click."
    b. Taps the bottom of the magazine firmly.
    c. Rapidly pulls the charging handle and releases to extract / eject the previous
    d. cartridge and feed, chamber, and lock a new round.
    e. Reassess by continuing the shot process.
336. What actions should be completed for each type of malfunction?
    a. Stove pipe - Grasp case and attempt to remove, cycle weapon and attempt to fire. If this fails, pull charging handle to the rear while holding case.
    b. Double-feed - the Soldier must remove the magazine, clear the weapon, confirm the chamber area is clear, secure a new loaded magazine into the magazine well, and chamber and lock a round.
    c. Bolt override - Remove magazine. Pull charging handle as far rearward as possible. Strike charging handle forward. If this fails, pull charging handle to the rear a second time, use tool or finger to hold the bolt to the rear, sharply send charging handle forward.
337. Rapid and continuous firing of several magazines in sequence without cooling, will severely elevate chamber temperatures. How could this affect how your rifle operates?
    a. While unlikely this elevated temperature may cause a malfunction known as a "cook-off". A "cook-off" may occur while the round is locked in the chamber, due to excessive heating of the ammunition. Or the rapid exposure to the cooler air outside of the chamber, due in part to the change in pressure.
338. If the Soldier determines that he has a potential "cook-off" situation he should do what?
    a. Leave the weapon directed at the target, or in a known safe direction, and follow proper weapons handling procedures, until the barrel of the weapon has had time to cool. If the chambered round has not been locked in the chamber for 10 seconds, it should be ejected as quickly as possible. If the length of time is questionable or known to be longer than 10 seconds and it is tactically sound, the Soldier should follow the above procedures until the weapon is cooled. If it is necessary to remove the round before the weapon has time to cool, the Soldier should do so with care as the ejected round may detonate due to rapid cooling in open air.

339. What are vertical movements?
    a. Are those actions taken to change their firing posture or negotiate terrain or obstacles while actively seeking, orienting on, or engaging threats.
340. Vertical movements include actions taken to—
    a. Change between any of the primary firing positions; standing, crouched,
    b. kneeling, sitting, or prone.
    c. Negotiate stairwells in urban environments.
    d. Travel across inclined or descending surfaces, obstacles, or terrain.
341. What are horizontal movements?
    a. Actions taken to negotiate the battlefield while actively seeking, orienting on, or engaging threats.
342. There are eight horizontal movement techniques while maintaining weapon orientation on the threat—
    a. Forward - movement in a direction directly toward the adversary.
    b. Retrograde - movement rearward, in a direction away from the threat while maintaining weapon orientation on the threat.
    c. Lateral right/left - lateral, diagonal, forward, or retrograde movement to the right or left.
    d. Turning left/right/about - actions taken by the Soldier to change the weapon orientation left/right or to the rear, followed by the Soldier's direction of travel turning to the same orientation.
343. How should you move when shooting during forward movement?
    a. Roll the foot heel to toe to best provide a stable firing platform. Shooting while moving should be very close to the natural walking gait and come directly from the position obtained while stationary. Keep the weapon at the ready position. Always maintain awareness of the surroundings, both to your left and right, at all times during movement.
    b. Maintain an aggressive position.
    c. The feet should almost fall in line during movement. This straight-line movement will reduce the arc of movement and visible "bouncing" of the sight picture.
    d. Keep the muzzle of the weapon facing down range toward the expected or detected threat.
    e. Keep the hips as stationary as possible. Use the upper body as a turret, twisting at the waist, maintaining proper platform with the upper body.
344. During retrograde movement, the Soldier should—
    a. Take only one or two steps that will open the distance or reposition the feet. Place the feet in a toe to heel manner and drop the center body mass by consciously bending the knees, using a reverse combat glide.
    b. Maintain situational awareness of team members, debris, and terrain. Use the knees as a shock absorber to steady the body movement to maintain the stability of the upper body, stabilizing the rifle sight(s) on the target. Ensure all movement is smooth and steady to maintain stability. Bend forward at the waist to put as much mass as possible behind the weapon for recoil management. Keep the muzzle oriented downrange toward the expected or detected threat. Keep the

hips as stationary as possible. Use the upper body as a turret, twisting at the waist, maintaining proper platform with the upper body.

345. During lateral movement, Soldiers should—
    a. Place their feet heel to toe and drop their center mass by consciously bending the knees.
    b. Use the knees as a shock absorber to steady the body movement to maintain the stability of the upper body, stabilizing the rifle sight(s) on the target.
    c. Ensure all movement is smooth and steady to maintain stability. Bend forward at the waist to put as much mass as possible behind the weapon for recoil management.
    d. Roll the foot, heel to toe, as you place the foot on the ground and lift it up again to provide for the smoothest motion possible.
    e. Keep the weapon at the alert or ready carry. Do not aim in on the target until ready to engage.
    f. Maintain awareness of the surroundings, both to the left and right, at all times
    g. during movement.
    h. Trigger control when moving is based on the wobble area. The Soldier shoots
    i. when the sights are most stable, not based on foot position.
    j. Keep the muzzle of the weapon facing down range toward the threat.
    k. When moving, the placement of the feet should be heel to toe.
    l. Do not overstep or cross the feet, because this can decrease the Soldier's
    m. balance and center of gravity.
    n. Keep the hips as stationary as possible. Use the upper body as a turret,
    o. twisting at the waist, maintaining proper platform with the upper body.

346. When executing a turn to either side, the Soldier will—
    a. Look first. Turn head to the direction of the turn first.
    b. Weapon follows the eyes. The Soldier moves the weapon smoothly to where
    c. the eyes go.
    d. Follow with the body. The body will begin movement with the movement
    e. of the weapon. Soldiers finish the body movement smoothly to maintain the
    f. best possible stability for the weapon.
    g. Maintain situational awareness. The Soldier must be completely aware of
    h. the surrounding terrain, particularly for tripping hazards. When necessary,
    i. Soldiers should visually check their surroundings during the turning action
    j. and return their vision to the target area as quickly as possible.

347. Ammunition for use in rifles and carbines is described as a cartridge. What is a cartridge?
    a. A small arms cartridge (see figure A-1) is an assembly consisting of a cartridge case, a primer, a quantity of propellant, and a bullet.

348. What are the components for a centerfire rifle cartridge?
    a. Cartridge case. The cartridge case is a brass, rimless, center-fire case that provides a means to hold the other components of the cartridge.

349. What is a Propellant?

a. The propellant (or powder) provides the energy to propel the projectile through the barrel and downrange towards a target through combustion.

350. What is a primer?
    a. The primer is a small explosive charge that provides an ignition source for the propellant.

351. The bullet or projectile is the only component that travels to the target. There are multiple types of bullets used for various purposes. What are some common examples of different bullet types?
    a. Ball, tracer, armor-piercing, blank, special ball long range (LR), dummy, and short range training.

352. What are cartridge cases made from?
    a. The cartridge case is made of steel, aluminum, or a brass combination (70 percent copper and 30 percent zinc) for military use.

353. The M4- and M16-series weapons is a rimless cartridge case that provides an extraction groove (shown in figure A-2). These cartridge cases are designed to support center-fire operation. All 5.56mm ammunition uses the rimless cartridge case. What is a rimless cartridge case?
    a. A rimless cartridge is where the rim diameter is the same as the case body, and uses an extractor groove to facilitate the cycle of functioning. This design allows for the stacking of multiple cartridges in a magazine.

354. The bullet is a cylindrically shaped lead or alloy projectile that engages with the rifling of the barrel. What are bullets commonly made from?
    a. Newer projectiles consist of a copper slug with exposed steel penetrator, as with the M855A1. The bullets used today are either lead (lead alloy), or assemblies of a jacket and a lead or steel core penetrator. The lead used in lead-alloy bullets is combined with tin, antimony or both for bullet hardness. The alloying reduces barrel leading and helps prevent the bullet from striping (jumping) the rifling during firing.

355. Jacketed bullets are used to obtain high velocities and are better suited for semiautomatic and automatic weapons. What are bullet jackets commonly made from?
    a. A bullet jacket may be either gilding metal, gilding metal-clad steel, or copper plated steel. In addition to a lead or steel core, they may contain other components or chemicals that provide a terminal ballistic characteristic for the bullet type.

356. What may some projectiles be made from?
    a. Plastic, wax, or plastic binder and metal powder, two or more metal powders, or various combinations based on the cartridge's use.

357. What is the Ball projectile intended for?
    a. Ball rounds are intended for use in rifles and carbines against personnel and unarmored targets. The bullet, as designed for general purpose combat and training requirements, normally consists of a metal jacket and a lead slug.

358. What is a Tracer round?
    a. A tracer round contains a pyrotechnic composition in the base of the bullet to permit visible observation of the bullet's in-flight path or trajectory and point of

impact. The pyrotechnic composition is ignited by the propellant when the round is fired, emitting a bright flame visible by the firer. Tracer rounds may also be used to pinpoint enemy targets to ignite flammable materials and for signaling purposes.

359. What are armor piercing cartridges intended for?
    a. AP rounds are intended for use against personnel and light armored and unarmored targets, concrete shelters, and similar bullet- resistant targets. The bullet consists of a metal jacket and a hardened steel-alloy core. In addition, it may have a lead base filler and/or a lead point filler.
360. What are short range training rounds intended for?
    a. The short range training ammunition cartridges are designed for target practice where the maximum range is reduced for training purposes. This cartridge ballistically matches the ball cartridge out to 300 meters, and rapidly drops in velocity and accuracy. This allows for installations with restricted training range facilities to continue to operate with accurate munitions. This cartridge is also a preferred round when conducting training in a close quarters environment, like a shoot house or other enclosed training facility.
361. What is a blank cartridge? What is it intended for?
    a. Blanks are distinguished by the absence of a bullet or projectile. It is used for simulated fire, in training maneuvers, and for ceremonial purposes. These rounds consist of a roll crimp (knurl) or cannelure on the body of the case, which holds a paper wad in place instead of a projectile. Newer cartridges have rosette crimp (7 petals) and an identification knurl on the cartridge case.
362. How can small arms ammunition be identified?
    a. Color coding specification per type and intended use. Table A-1 describes the general color codes for all types of 5.56mm small arms ammunition. Table A-2 identifies the color code specifications that are applied to the tip of 5.56mm ammunition.
363. What is the study of internal ballistics?
    a. Study of the propulsion of a projectile. Internal ballistics begin from the time the firing pin strikes the primer to the time the bullet leaves the muzzle. Once the primer is struck the priming charge ignites the propellant. The expanding gasses caused by the burning propellant create pressures which push the bullet down the barrel. The bullet engages the lands and grooves (rifling) imparting a spin on the bullet that facilitates stabilization of the projectile during flight. Internal ballistics ends at shot exit, where the bullet leaves the muzzle.
364. What is the study of external ballistics?
    a. The study of the physical actions and effects of gravity, drag, and wind along the projectile's flight to the target. It includes only those general physical actions that cause the greatest change to the flight of a projectile. External ballistics begins at shot exit and continues through the moment the projectile strikes the target.
365. What is the axis of a rifle's bore?
    a. The line passing through the center of the bore or barrel.
366. What is a weapon's line of sight?

a. A straight line between the sights or optics and the target. This is never the same as the axis of the bore. The LOS is what the Soldier sees through the sights and can be illustrated by drawing an imaginary line from the firer's eye through the rear and front sights out to infinity. The LOS is synonymous with the GTL when viewing the relationship of the sights to a target.

367. What is a line of elevation?
    a. the angle represented from the ground to the axis of the bore.
368. What is the ballistic trajectory of a projectile?
    a. the path of a projectile when influenced only by external forces, such as gravity and atmospheric friction.
369. What is a maximum ordinate?
    a. The maximum height the projectile will travel above the line of sight on its path to the point of impact.
370. What is a bullet's time of flight?
    a. The time taken for a specific projectile to reach a given distance after firing.
371. What is the definition of jump?
    a. Vertical jump in an upward and rearward direction caused by recoil. Typically, it is the angle, measured in mils, between the line of departure and the line of elevation.
372. What is considered the line of departure?
    a. The line the projectile is on at shot exit.
373. What is the definition of muzzle velocity?
    a. The velocity of the projectile measured at shot exit. Muzzle velocity decreases over time due to air resistance. For small arms ammunition, velocity (V) is represented in feet per second (f/s).
374. What is a rifle's twist rate? Why is rate of twist important for ballistics?
    a. The rotation of the projectile within the barrel of a rifled weapon based on the distance to complete one revolution. The twist rate relates to the ability to gyroscopically spin-stabilize a projectile on rifled barrels, improving its aerodynamic stability and accuracy. The twist rate of the M4- or M16-series weapon is a right hand, one revolution in every seven inches of barrel length (or R 1:7 inches).
375. What is considered the shot exit?
    a. The moment the projectile clears the muzzle of the barrel, where the bullet is not supported by the barrel.
376. What is considered oscillation?
    a. the movement of the projectile in a circular pattern around its axis during flight.
377. What is considered drift?
    a. the lateral movement of a projectile during its flight caused by its rotation or spin.
378. What is yaw?
    a. A deviation from stable flight by oscillation. This can be caused by cross wind or destabilization when the projectile enters or exits a transonic stage.
379. What is a grain?

a. A unit of measurement of either a bullet or a propellant charge. There are 7000 grains in a pound, or 437.5 grains per ounce.

380. Why is pressure relevant to ballistics?
    a. The force developed by the expanding gases generated by the combustion (burning) of the propellant. For small arms, pressure is measured in pounds per square inch (psi).
381. What is Gravity and why is it important to projectile ballistics?
    a. The constant pressure of the earth on a projectile at a rate of about 9.8 meters per second squared, regardless of the projectile's weight, shape or velocity. Commonly referred to as bullet drop, gravity causes the projectile to drop from the line of departure. Soldiers must understand the effects of gravity on the projectile when zeroing as well as how it applies to determining the appropriate hold-off at ranges beyond the zero distance.
382. What is Drag and why is it relevant to rifle ballistics?
    a. The friction that slows the projectile down while moving through the air. Drag begins immediately upon the projectile exiting the barrel (shot exit). It slows the projectile's velocity over time, and is most pronounced at extended ranges. Each round has a ballistic coefficient (BC) that is a measurement of the projectile's ability to minimize the effects of air resistance (drag) during flight.
383. What is the definition for Trajectory?
    a. The path of flight that the projectile takes upon shot exit over time. For the purposes of this manual, the trajectory ends at the point of impact.
384. What three components of wind have the greatest impact on projectile ballistics?
    a. The effects of wind on a projectile are most noticeable in three key areas between half and two-thirds the distance to the target:
    b. Time
    c. Direction
    d. Velocity
385. Why is travel time in wind relevant to external ballistics?
    a. the amount of time the projectile is exposed to the wind along the trajectory. The greater the range to target, the greater time the projectile is exposed to the wind's effects.
386. Why is wind direction relevant to external ballistics?
    a. the direction of the wind in relation to the axis of the bore. This determines the direction of drift of the projectile that should be compensated.
387. Why is Wind velocity relevant to external ballistics?
    a. the speed of the wind during the projectile's trajectory to the target. Variables in the overall wind velocity affecting a change to the ballistic trajectory include sustained rate of the wind and gust spikes in velocity.
388. What is kinetic energy?
    a. a unit of measurement of the delivered force of a projectile. Kinetic energy is the delivered energy that a projectile possesses due to its mass and velocity at the time of impact. Kinetic energy is directly related to the penetration capability of a projectile against the target.

389. What is penetration and why is it relevant to ballistics?
    a. the ability or act of a projectile to enter a target's mass based on its delivered kinetic energy. When a projectile strikes a target, the level of penetration into the target is termed the impact depth. The impact depth is the distance from the point of impact to the moment the projectile stops at its terminal resting place. Ultimately, the projectile stops when it has transferred its momentum to an equal mass of the medium (or arresting medium).
390. What is the most important terminal ballistic consideration?
    a. Against any target, penetration is the most important terminal ballistic consideration. Soldiers must be aware of the penetration capabilities of their ammunition against their target, and the most probable results of the terminal ballistics.
391. What happens when terminal ballistics begins?
    a. No bullets follow the same path or function. Generally speaking, the projectile will penetrate objects where the delivered energy (mass times velocity squared, divided by 2) is greater than the mass, density, and area of the target at the point of the delivered force. There are other contributing factors, such as the angle of attack, yaw, oscillation, and other physical considerations that are not included in this ballistic discussion.
392. The following common barriers in built-up areas can prevent penetration by a 5.56-mm round fired at less than 50 meters (M855) including:
    a. Single row sandbags.
    b. A 2-inch thick concrete wall (not reinforced with rebar or similar item).
    c. A 55-gallon drum filled with water or sand.
    d. A metal ammunition can filled with sand.
    e. A cinder block filled with sand (the block may shatter).
    f. A plate glass windowpane at a 45-degree angle (glass fragments will be
    g. thrown behind the glass).
    h. A brick veneer.
393. What is the best method for breaching a masonry wall?
    a. The best method for breaching a masonry wall is by firing short bursts in a U-shaped pattern. The distance from the firer to the wall should be minimized for best results—ranges as close as 25 meters are relatively safe from ricochet.
394. What is soft tissue penetration?
    a. A gunshot wound, or ballistic trauma, is a form of physical damage sustained from the entry of a projectile. The degree of tissue disruption caused by a projectile is related to the size of the cavities created by the projectile as it passes through the target's tissue. When striking a personnel target, there are two types of cavities created by the projectile; permanent and temporary wound cavities.
395. What is considered the permanent cavity?
    a. The physical hole left in the tissues of soft targets by the pass-through of a projectile. It is the total volume of tissue crushed or destroyed along the path of the projectile within the soft target.

396. Depending on the soft tissue composition and density, the tissues are either elastic or rigid. How do elastic and rigid organs respond to gunshot wounds?
    a. Elastic organs stretch when penetrated, leaving a smaller wound cavity. Organs that contain dense tissue, water, or blood are rigid, and can shatter from the force of the projectile. When a rigid organ shatters from a penetrating bullet, it causes massive blood loss within a larger permanent wound cavity. Although typically fatal, striking these organs may not immediately incapacitate the target.
397. What is the temporary wound cavity?
    a. The temporary wound cavity is an area that surrounds the permanent wound cavity. It is created by soft, elastic tissues as the projectile passes through the tissue at greater than 2000 feet per second. The tissue around the permanent cavity is propelled outward (stretched) in an almost explosive manner from the path of the bullet. This forms a temporary recess or cavity 10 to 12 times the bullet's diameter.
398. What is bullet deformation?
    a. The physical changes of the projectile's original shape and design due to the impact of the target. This increases the projectile's surface area and the size of the cavity created after penetration.
399. What is bullet fragmentation?
    a. The fracturing of a projectile into multiple pieces or sub- projectiles. The multiple paths of the fragmented sub-projectiles are unpredictable in size, velocity, and direction. The bullet jacket, and for some types of projectiles, the lead core, fracture creating small, jagged, sharp edged pieces that are propelled outward with the temporary cavity. Fragments can sever tissue, causing large, seemingly explosive-type. Bone fragments caused by the bullet's strike can have the same effect.
400. What is bullet tumbling?
    a. The inadvertent end-over-end rotation of the projectile. As a projectile tumbles as it strikes the target, the bullet travels through the tissues with a larger diameter. This causes a more severe permanent cavity as it passes through the soft tissue. A tumbling projectile can change direction erratically within the body due to its velocity and tendency to strike dense material with a larger surface area.

401. Once inside the target, what is the projectile's purpose?
    a. The projectile's purpose is to destroy soft tissues with fragmentation. The ball ammunition is designed to not flatten or expand on impact, which would decrease velocity and delivered energy. For the M855-series cartridge, the penetrator tends to bend at the steel-core junction, fracture the weaker jacketed layer, and fragment into pieces when striking an object.
402. What is incapacitation with direct fire?
    a. Incapacitation with direct fire is the act of ballistically depriving a target of the ability, strength, or capability to continue its tactical mission. To assist in achieving the highest probability of incapacitation with a single shot, the projectile is designed with the ability to tumble, ricochet, or fragment after impact.

403. What is the soldier's primary point of aim when engaging an enemy?
    a. Center mass. This allows for a tolerance that includes the greatest margin of error with the highest probability of a first round hit. The combat conditions may require more precise fires at partially exposed targets or targets that require immediate incapacitation.
404. Why should shots to the head be weighed with caution?
    a. The head is the most frequently moved body part and are the most difficult to hit with precision. Shots to other exposed body parts, such as the pelvic area, should be considered for the shot.
405. When are shots to the pelvic area used?
    a. Shots to the pelvic area are used when the target is not completely visible or when the target is wearing body armor that prevents the Soldier from engaging the primary zone. This area is rich in large blood vessels and a shot here has a good possibility of impeding enemy movement by destroying the pelvic or hitting the lower spine.
406. What are Circuitry Shots?
    a. Circuitry shots, or "switches," are strikes to a target that deliver its immediate incapacitation. Immediate incapacitation is the sudden physical or mental inability to initiate or complete any physical task. To accomplish this, the central nervous system must be destroyed by hitting the brain or spinal column. All bodily functions and voluntary actions cease when the brain is destroyed and if the spinal column is broken, all functions cease below the break.
407. What are hydraulic shots, or "timer" shots?
    a. These types of ballistic trauma are termed "timers" as that after the strike of the bullet, the damage caused requires time for the threat to have sufficient blood loss to render it incapacitated. Hydraulic shots, although ultimately lethal, allow for the threat to function in a reduced capacity for a period of time.
408. What must occur for hydraulic shots to eliminate a target?
    a. For hydraulic shots to eliminate the threat, they must cause a 40 percent loss of blood within the circulatory system.
409. What will occur if the shots do not disrupt blood flow at a rapid pace?
    a. The target will be able to continue its mission. Once two (2) liters of blood are lost, the target will transition into hypovolemic shock and become incapacitated.
410. What must the soldiers understand when operating weapon systems?
    a. Location of friendly forces, weapon status, and proper evaluation of the environment.