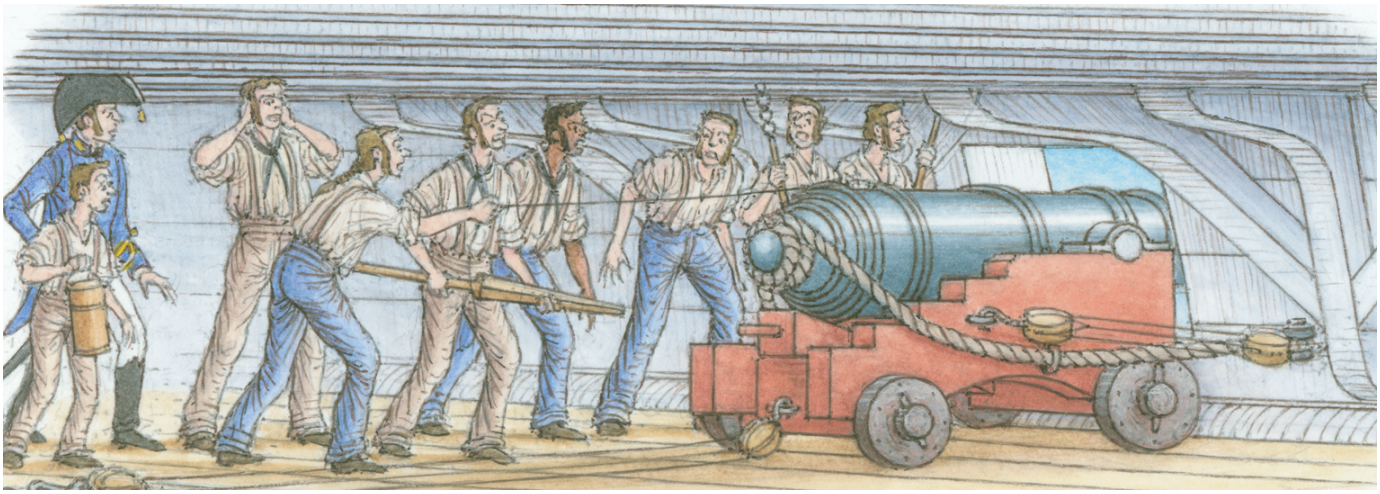
READY? AIM. FIRE!

Although Joshua Humphreys designed *Constitution* to have great agility, strength, and speed, the ship needed to be armed in order to win battles. *Constitution* carried over 50 cannons, also known as "guns," that were measured according to the weight of the cannon ball (or "shot") that they fired. For example, a cannon that fired a 24-pound shot would be called a "twenty-four pounder."



Think about how far you can throw a baseball. Now think about how far you could throw a 24-pound cannon ball (that's 72 times heavier than a baseball!). If it is a struggle for us to throw something that weighs 24 pounds, how were *Constitution*'s guns able to shoot cannon balls long distances *and* damage the enemy ship? The secret was in the chemical reaction from the burning gunpowder inside the cannon. When the gunpowder was on fire, it produced a gas that expanded and created pressure. This pressure pushed the shot out of the barrel of the cannon and toward the enemy ship. Take a look at the "How Did a Cannon Fire?" diagram and learn about how much work it took to fire a single shot!

BUILD AND FIRE YOUR OWN CANNON!

Gather the listed materials and follow the directions to build and test your own miniature cannon. Imagine that the film canister is a cannon and the Alka-Seltzer® is gun powder - a chemical reaction similar to the one inside a cannon will take place the film canister. Make sure you have an adult with you while conducting this experiment and that you test your cannon outdoors or somewhere you don't mind getting a bit wet.

MATERIALS

An empty 35mm film container

1/3 Alka-Seltzer® tablet

Warm water

Safety glasses (swimming goggles or sunglasses will work!)

DIRECTIONS

1. Fill the film container 1/3 full with warm water.

2. Add 1/3 Alka-Seltzer® tablet and quickly pop the lid back on the film container.

3. Place the container (top up) on the ground and take five large steps back. Wait.

4. If it takes your cannon more than twenty seconds to fire, ask an adult for help.

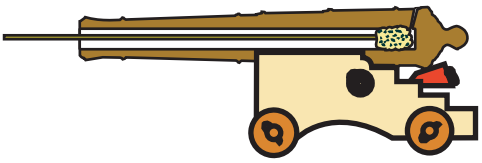
★ Try the experiment again with different water temperatures or a different amount of Alka-Seltzer®. Does the speed or height of the "cannon" change? What about the "popping" noise?

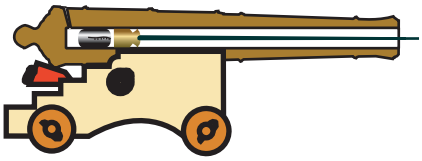
HOW DID A CANNON FIRE?

In 1812, the commands below were given by an officer to a gun team of nine to fourteen sailors. It took well-trained men approximately two minutes to complete the seventeen steps involved in firing a cannon. Below is a simplified version of those seventeen steps.

SPONGE YOUR GUNS!

Sailors used a wet sponge to extinguish any burning materials from the previous cannon fire.



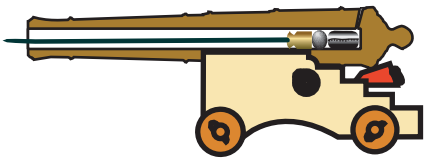


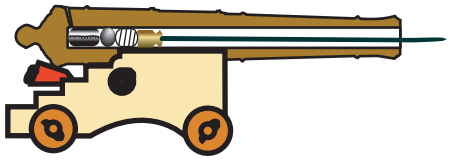
LOAD YOUR CARTRIDGE!

A cloth bag filled with a pre-measured supply of gunpowder (called a "cartridge") was pushed down the cannon barrel.

SHOT YOUR GUNS!

A cannon ball was loaded into the cannon barrel and pushed against the cartridge.



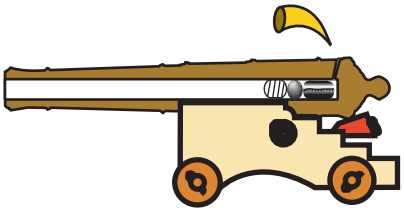


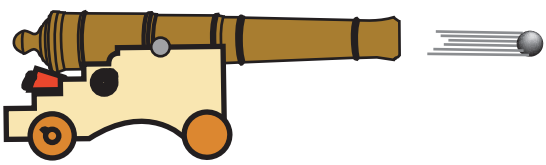
WAD TO YOUR SHOT!

A disc called a "wad" (often made of old rope) was pushed against the cannon ball to hold the shot in place.

PRIME YOUR GUNS!

A small amount of loose gunpowder was poured from a powder horn into the touch hole.





FIRE!

A spark from the match or "flint lock" ignited the gunpowder in the touch hole. This powder burned and lit the cartridge on fire. The ignited cartridge pushed the shot out of the barrel and, huzzah! The shot was fired!