Name:

Date:

History of Ballooning Notes

Two types of balloons

* Hot air balloons
  + Use to create lift
  + Requires a means to heat the air inside of the balloon
  + More issues with temperature
  + Potential
* Gas balloons
  + Use a “lighter than air” gas to produce lift
  + More common throughout much of ballooning’s history
  + Fewer issues with temperature
  + Once the gas escapes, it’s gone

Ballooning

* of human flight
  + Barring a few, very poorly thought out, hang gliding attempts
* First flight across the English Channel
* First flight in North America
* First aircraft-related disaster

Pre-modern and Unmanned Balloons

* Kongming Lanterns
  + Three Kingdoms Era – China (220-280 AD)
  + Zhuge Liang of the Shu Han kingdom
  + Airborne lanterns for
* Battle of Legnica – Poland, 1241 AD
  + Mongolian army used kongming lanterns for signaling
  + First time encountered a flying balloon
* Bartolomeu de Gusmao
  + Brazillian-Portuguese priest
  + Moved to Lisbon, Portugal to attend the University of Coimbra
  + Lifted a small paper balloon about 4 meters in front of King John V and the Portuguese court
    - August 8, 1709
    - Third attempt
  + balloon flight in Europe

Jacques Charles

* Jacques Charles
  + Charles Law
    - Law on gas volumes
  + Studied the works of Henry Cavendish, Joseph Black, Tiberius Cavallo
    - Centered on gas laws, principles of flight, other foundational pieces
  + Designed the first balloon

Les Freres Robert

* Anne-Jean Robert and Nicolas-Louis Robert
  + Designed the lightweight, airtight for hydrogen balloons
  + Rubberized silk sheets sewn together
  + Originally used red and white
    - Rubberizing process caused the white to turn yellow

First Hydrogen Balloon

* Balloon launched on
  + Lots of excitement so launch was moved to a larger area
  + Champs-de-Mars
    - Location of the Eiffel Tower
  + Benjamin Franklin reportedly present
* Relatively small balloon
  + 35 cubic meter sphere
  + Only lift about 9 kg (20 lbs or so)
* Filled with
  + Made by pouring ¼ tonne sulphuric acid on ½ tonne of scrap iron
  + Fed into the balloon with lead pipes
    - Challenges due to the gas cooling and contracting once in the balloon
  + Took several days
* Flew for 45 minutes
  + Pursued by chasers on horseback
  + Landed in the Village of Genoese
    - with knives and pitchforks

Montgolfier Brothers

* Montgolfier Brothers
  + Joseph-Michael Montgolfier (1740-1810)
    - 12th of 16 children
  + Jacques-Etienne Mongolfier (1745-1799)
    - 15th of 16 children
* Family was
  + Annonay, France
* Ideas came from watching

First Unmanned Flight

* + Created by the Montgolfier brothers
* Launched on September 19, 1783
  + in a basket slung under the balloon
    - Sheep – Montauciel (climb-to-the-sky), Duck, Rooster
    - Study the effects of
  + Royal Palace at Versailles before King Louis XVI and Marie Antoinette
  + Lasted 8 minutes, covered 2 miles, rose to 1500 feet, landed safely

First Manned Hot Air Balloon Flight

* Montgolfier Brothers
  + AGAIN!!!!
* First balloon flight

  + Powered by hot air
  + Gradually ascended and descended as air entered and escaped
  + Jean-Francois Pilatre de Rozier, Jean-Baptiste Reveillon, Giroud de Villette
  + Flew at Folie Titon, Paris
* First untethered or free flight occurred on
* Louis XVI ordered to be the passengers
  + De Rozier and Marquis Francois d’Arlandes successfully petitioned for the chance
* Hot air balloon
  + Iron basket held the fire under the balloon mouth

First Manned Hydrogen Balloon Flight

* Jacques Charles and the Robert Brothers
* December 1, 1783
  + A few days after the Montgolfier brothers launched theirs
  + Jardin des Tuileries, Paris
* Jacques Charles and Nicolas-Louis Robert
  + 380-cubic meter balloon
  + Hydrogen release valve
  + 1800 feet, over 2 hours, 36 kilometers
* Charles and Robert carried
  + Measure pressure and temperature of the air at altitude
  + First above the earth’s surface
* Over 400,000 spectators
  + Many paid 1 crown to help finance the flight and receive a closer view
  + Benjamin Franklin and Joseph Montgolfier also present

The British Are Coming!

* + August 27, 1784
  + Abbeyhill to the suburbs of Edinburgh, Scotland
    - 10 minutes, 350 feet
  + First flight in the
* Signor Vincent Lunardi
  + London – September 15, 1784
  + First flight in
* Richard Crosbie
  + Ranelagh Gardens, Dublin – 1785
  + First flight in

English Channel Flight

* Considered the first flight
* Pilatre de Rozier
  + Experimental design using hydrogen and hot air
  + Balloon about 30 minutes into the flight
* Jean-Pierre Blanchard and John Jeffries
  + First to fly across the English Channel
    - Gas Balloon
    - Flew from Dover to Calais

North American Ballooning

* + Same one who crossed the English Channel
* January 9, 1793
  + Took off from a prison yard in Philadelphia, Pennsylvania
  + Landed in Gloucester County, New Jersey
  + Reached a height of 5800 feet
  + observed the launch

Thaddeus Lowe

* Thaddeus Lowe
  + Civil War era aeronaut, scientist, inventor
  + Largely self taught in chemistry, meteorology, and aeronautics
  + Founded the
* Plied his ballooning talents to the Union’s cause in the form of

Union Army Balloon Corps

* Formed by Abraham Lincoln and Thaddeus Lowe
* 7 gas balloons used for aerial reconnaissance
  + Telegraph, hand signals, flag signals, lanterns, megaphone used to communicate
  + Union could point artillery at an “invisible” enemy
  + *General Washington Parke Custis*
* Served at , Seven Pines, , and Fredericksburg
* Disbanded in 1863

Airships

* balloons
  + Filled with hydrogen
  + First started to be built in the early 1900s
  + Flaps and propellers to make them steerable
* Graf Zeppelin was the first airship built
  + 420 feet long, 600 miles in 2 days
* Both civilian and military applications

The Hindenburg

* Germany, 1936
* 803 feet long, 135 feet wide
  + 7 cubic feet of gas
* May 6, 1935 caught fire
  + Burned in less than
  + 35 people lost their lives
* Hydrogen airships phased out in favor of helium
  + Helium gas and not widely available
  + Strange due to safety record

Modern Ballooning

* Paul E. Yost
  + October 22, 1960
  + Modern envelope and for a hot air balloon
  + Father of modern ballooning
* Most sport ballooning done with
  + First U.S. National Hot Air Balloon Championship – 1963
  + Less expensive than helium
* Long distance flights
  + Trans-Atlantic and Pacific flights
  + flights
* Scientific and military balloons still used