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