AS 100 Chap 1 Lesson 2 The Early Days of Flight

MP 1 DEVELOPMENT IN LIGHTER-TAN-AIR FLIGHT FROM DA VINCI TO THE WRIGHT BROTHERS

1. Principles of balloon flight
   - Buoyancy – gas inside balloon is lighter than air around it
   - Hot air helps first challenge of getting in air

2. Laurenco de Gusmao – Credit for 1st hot air balloon
   - 1709 demonstrated to King of Portugal

3. Montgolfier brothers had 1st balloon flight with humans
   - 21 Nov 1783 – 25 minute flt over Paris

4. Fireplace idea
   - Montgolfier brothers 1st to achieve manned flight
   - Experiment with silk bag and fire
   - Discovered hot air rises above cooler air
   - French King Louis XVI asked for demonstration

5. Brother’s needed to keep balloon in air
   - Fire under balloon meant carrying fuel – dangerous and heavy
   - J.A.C. Charles found hydrogen – more lift than hot air
   - Hydrogen very flammable
   - 1st hydrogen flt 1 Dec 1783 – 2 hrs/27 miles
   - Ben Franklin told military about balloon – French Army used in 1793
   - Aerial Reconnaissance – *Looking over battlefields from sky*

6. Dirigibles – Steerable acft
   - 2 of three problems solved – getting up/staying up
   - Now needed to control the aircraft
   - Rudders – movable flap/blade attached to rear of acft
   - Power sources to drive propellers

7. Henri Giffard – Cigar shaped dirigible
   - 3 HP steam engine – 5 mph

8. Invention of keels
   - Structure that extends from front to back along center
   - Keeps rigidity
   - Rigid and Non-rigid

9. German Paul Haenlein – Dirigible w/ internal combustion engine
10. Santos-Dumont
   - 3 HP gasoline motor non-rigid acft
   - Flew around Eiffel Tower (1901)

11. Count von Zeppelin
   - First successful Rigid Dirigible (LZ-1)
   - Led to world’s first commercial airships (Zeppelins)

**MP 2 WAYS BALLOONS WERE USED DURING US CIVIL WAR**

1. US Armed Forces first used balloons in Civil War
   - Aeronauts volunteered services
   - Used for Aerial Recon

2. Thaddeus Lowe
   - Tried to interest Gen Scott in balloons
   - Lowe had friend Joseph Henry to talk to Pres Lincoln
   - Demonstration successful
   - Led to Balloon Corps of Union Army – 1st air arm of US Military
   - Disbanded in 1863

**MP 3 WAYS THE BALLOON CONTRIBUTED TO US VICTORY IN THE BATTLE OF SAN JUAN HILL DURING THE SPANISH-AMERICAN WAR**

1. US Congress gave Signal Corp duty of collecting/transmitting info for Army
   - Military not used balloons in 30 yrs
   - BG Greely established balloon section in Signal Corps for aerial navigation
   - Few yrs later we were at war w/ Spain
   - Allowed army to see what balloons could do

2. General Derby brought balloons close to action as possible
   - Identified new trail leading to Spanish Forces
   - Divided soldiers up to relieve congestion on main road
   - Observers suggested artillery fire – Turned battle into US victory

**MP 4 DEVELOPMENTS IN HEAVIER-THAN-AIR FLIGHT FROM DA VINCI TO THE WRIGHT BROTHERS**

1. Gliders
   - Sir George Cayley – Designed fixed wing w/ for lift and separate system for propulsion
   - Identified 3 important forces
     - Lift, thrust, drag
   - 1850 – Designed 1st full-size glider
   - Recognized need for right kind of engine to propel acft
2. John Montgomery
   - 1905 Glider w/ sharp dives/turns
   - Reached 68mph
   - Earthquake destroyed gliders
   - Died 1911 in glider accident

3. Otto Lilienthal – “Father of Modern Aviation”
   - Developed powered biplane (two main supporting surfaces, one above the other)
   - Died in glider crash

4. Failed attempts to construct an airplane
   - Henson and Stringfellow – Designed acft to carry a man
   - Received patent
   - Acft was called Ariel – a monoplane (single wing airplane)
   - 150 ft wing span w/ steam eng driving two six-bladed propellers
   - 1848 Stringfellow 1st successful powered flight of a heavier-than-air craft

5. Samuel Langley
   - 1st to try and build acft w/ motor