Essential Question: 18 September 2020

What did George Cayley do to earn himself the title “Father of Aviation”?

Questions/Key Points	Notes
How did Cayley find out about flying? What made him want to study it?	● Biography ○ (overview)https://www.britannica.com/biography/Sir-George-Cayley ○ (detailed)https://www.aerosociety.com/media/4862/sir-george-cayley-the-invention-of-the-aeroplane-near-scarborough-at-the-time-of-trafalgar.pdf ○ Born in 1773 in Yorkshire, England; died 1854 ■ For reference, the first manned balloon flight was in 1783 in France. ○ Education - was tutored by private scholars who taught him math and physics ○ Inherited his baronet status from his father - means he was a common class citizen but still allowed to be called “sir” ○ The mathematician Theodore von Karman claims that “Thus the principle of the airplane as we know it now, that of the rigid airplane was first announced by Cayley.” ○ Other things said about Cayley: https://www.lakesgc.co.uk/mainwebpages/eBook%20Library/Batch%202/Sample%20books%20batch%202/Sir%20George%20Cayley's%20Aeronautics%201796-1855%20-%20sample.pdf#page=7 ■ As American students, we’re always taught that the Wright brothers invented the airplane ■ George cayley came 100 years before them, but they’re still given the credit ■ I was honestly surprised to see America-centrism in something as specific as aviation history, but what was I expecting?
How was Cayley’s work published? In what way did he “figure it out”? What new things did he learn and create?	● Experimentation, builds and achievements ○ *On Aerial Navigation* ■ https://books.google.com/books?hl=en&lr=&id=-GSO6i6hWtwC&oi=fnd&pg=PA153&dq=george+cayley&ots=Caew2UU5yJ&sig=85m4FesoPzW7H6K6zlHWxuGpfpg#v=onepage&q&f=false ■ His main publication in which he described his work ■ Published in 1809 ○ “Mr Garnerin’s descent in one of those machines [parachutes] will be in the recollection of many; and I make the remark for the purpose of alluding to the continued oscillation, or want of steadiness...the only machines of this sort, which have been constructed, are nearly of the worst possible form” ■ Noticed someone descending in a parachute and noticed its danger. Thus, he wanted to improve upon it ● Took a very mathematical and physics-oriented approach to observations ○ Silver Disk ■ Engraved an idea for a flying machine on a disc of silver

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How did Cayley’s work affect those who came after him? How can we apply it today?	■ Separated propulsion and lifting systems, which was one reason why ornithopters failed ○ Studies overall ■ Systematic, scientific approach ■ Uses questioning, observations, proposals for improvements to a problem ○ Notable inventions ■ Solid of Least Resistance (*Aerial* pg 171) ● He pretty much invented the airfoil ■ (pg 155) Studied stability in flight through center of gravity and center of pressure, which wasn’t well understood at the time ■ Made several designs of small unmanned gliders until he eventually made one that could carry a person ● https://yorkshireairmuseum.org/exhibits/pre-world-war-ii-aircraft/cayley-glider/ ○ What he didn’t do ■ Add an engine to an airplane; the engines available at the time were too heavy and would not have worked. ● Legacy ○ Directly impacted the work of the Wright Brothers ■ “About 100 years ago an Englishman, Sir George Cayley, carried the science of flying to a point which it had never reached before and which it scarcely reached again during the last century” - Wilbur Wright

Summary

George Cayley was the first to create and study fixed-wing flight and aerodynamics. He used a methodical and scientific approach that allowed him to closely observe and study things. George Cayley almost didn’t publish his work - he heard that a man had flown in Austria but was not aware that he flew in a balloon and not a fixed-wing aircraft. Cayley had set the standard configuration for modern aircraft, in which propulsion and lift systems were separate. This means that his legacy can be seen on almost every modern aircraft.