

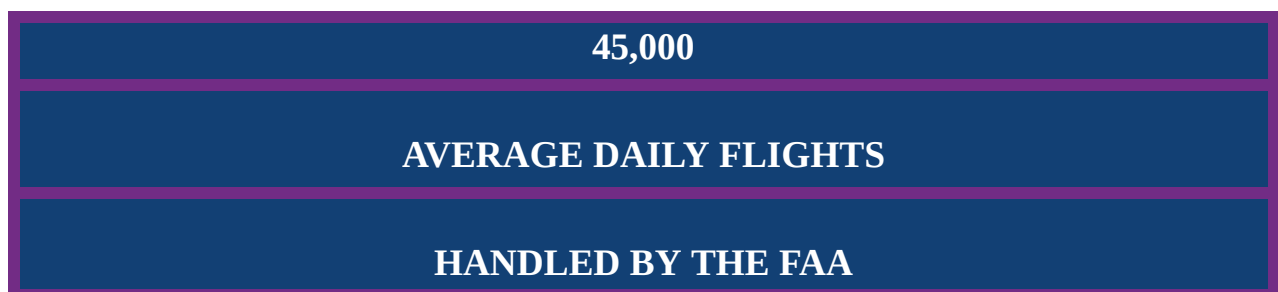
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 Air Traffic by the numbers
 Airplanes
 8 September 2021

Mrs. Ginsberg
 Grade 7
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 Grade 6

Airplanes

For hundreds of years, mankind has been trying to reach the sky for many purposes. Like being able to go across giant oceans without it taking months. Or being able to climb over mountain ranges in an hour or two. This would make life easier for thousands of people every day. This was a fantasy until Wilbur and Orville Wright built the first modern airplane. In 1903 it flew about 50 feet to 13 feet above the ground. It's small but it is A starting point for aviation. Like guilders required help so did it until later in the century. When you think of airplanes, what do you think of? Do you think fast nimble for every fighter like the F-35; or do you think of gaunt passenger airliners like the 747. Well, you're both right.

Air Traffic by the numbers



**SCHEDULED PASSENGER
FLIGHTS YEARLY**

5,400
**AIRCRAFT IN THE SKY AT
PEAK OPERATIONAL TIMES**

24,100,000
**SQUARE MILES OF
OCEANIC AIRSPACE**

5,300,000
**SQUARE MILES OF UNITED
STATES DOMESTIC AIRSPACE**

520
**AIRPORT TRAFFIC
CONTROL TOWERS**

19,633

U.S. AIRPORTS

5,082 PUBLIC AIRPORTS

14,551 PRIVATE AIRPORTS

21

AIR ROUTE TRAFFIC

CONTROL CENTERS

14,000+

AIR TRAFFIC

CONTROLLERS

2,900,000+

PASSENGERS FLY EVERY

DAY IN AND OUT OF

U.S. AIRPORTS

167,000+

FIXED-WING GENERAL

AVIATION AIRCRAFT

10,000
ROTORCRAFT

34,200
EXPERIMENTAL
LIGHTCRAFT

25,506,000
GENERAL AVIATION
FLIGHT HOURS PER YEAR

44,500,000,000
POUNDS OF FREIGHT
PER YEAR

10,857,000
U.S. JOBS GENERATED
FROM AVIATION

147**TERMINAL RADAR****APPROACH CONTROL****FACILITIES****5.2%****AVIATION CONTRIBUTED****TO THE U.S. GROSS****DOMESTIC PRODUCT****\$440 Billion****AVIATION ANNUAL****INCOME OVER EVERYONE**

History

Powered flight technically started in 1903 flight was A great achievement for mankind. When man was finally able to take flight it was A celebration. People were cheering as the Concorde, A supersonic aircraft, touched down in Thalasse, Germany. (This is now Airbus headquarters.) This was its maiden voyage and 21 years later it was shut down and permanently grounded. It is still offline and other supersonic concepts are being developed and tested as you read this report. Air travel came to the masses in the *Pan-Am* Era. Otherwise, recognized as the 1930-1970s. Now it's time for an A lesson in aerodynamics.

Is this for progress? Orville Wright (1874-1948) lived to see the dawn of the jet age when Chuck Yeager broke the sound Barrier in 1947.

How do airplanes fly? A quick and painless lesson in aerodynamics

People have been building flying machines for a very long time. Leonardo D Vinci sketched a flapping wing airplane (ornithopter) in his notebooks around 1500. The Montgolfier Brothers made the first hot balloon flight in 1783, and Sir George Cayley built the first successful glider in 1853. However, it wasn't until the Wright brothers developed the first modern airplane in 1903 why did it take so long to overcome the natural forces????????

4 major forces are acting on an aircraft at once. Lift is the upward force that allows aircraft to fly. Lift apodosis weight that is holding an aircraft down. Thrust is the push or pulls forward that allows an airplane to move. Drag acts as a direction opposite to thrust. Airspeed is how fast the airplane is forward. Airplanes produce lift the same as birds do. In the 1890's glider builder Otto Lilienthal observed that a bird's wings have a special curved shape called a chamber is a secret to lifting. when air flows past a curved wing, it gets pushed down. push the wing up, that's lift!

Ok so what about Orville and Wilbur? Well, we need to move an airplane forward to get air flowing over the wing and get us to our destination. The same air that creates lift also creates drag. You can feel drag if you hand out a car window. Thrust Moves an airplane forward against drag, the more thrust we have the faster we can go. This is where the Wright brothers come in ... they figured out an engine and propeller combination that were light enough to fly with a pilot on board. today's jet airliners have huge wings made of metal alloys and exotic composites, and powerful jet engines instead of propellers but the forces work the same as on the Wright flyer over 120 years ago.

* ps... Sir Isaac Newton's 3 laws of motion state that for every action there is an equal and opposite reaction. In the case of lift, the action is to displace a mass of air downward. The opposite reaction is to displace an airplane upward. Propellers and jet engines generate thrust that moves the airplane forward. Now it's time for A

I.D. reel!

Id tip: RJ's have 4 cockpit windows

Airbus or Boeing have 6 (except the 787)

AIRBUS-or-BOEING? A clue look at the cockpit windows

Airbus: windows clipped at the top (except A350)

Boeing: windows clipped at the bottom

AIRBUS-or-BOEING? A clue for the two engine wide-bodies: look at the tail

Airbus: A330 & A340 fuselage is a straight line across the top

Boeing: 767, 777, & 787 fuselage slopes downward at the tail

EMBER or BOMBARDIER?

Ember: fuselage narrower than bombardier nose longer and pointer 2 fully enclosed engines on the tail.

bombardier: small air scoop and 2 engines on the tail that protrude from the nacelles.

AIRBUS

World's largest airliner. The A380 super Jumbo. 4 engines 2 under each wing. Main landing gear 4 struts. 20 wheels. 5 wheels per strut. Wingtips extend up and down. Fuselage: full twin deck with 2 rows of windows. It is in production anymore due to minimal profit. Along with that, It didn't have as long-range as A 747 which can travel around the world, and back in 1992, it went from San Francisco to San Francisco in 1 trip no stopping until they were there back at home airport.



A350 Extra wide body. Airbus' largest twinjet. Large, curved wingtips. 2 engines 1 under each wing. Larger windows. Composite winged & fuselage. Main landing gear 2 struts. 8 wheels. 4 wheels per strut.



A340 the only 4 engine single deck airbus. 4 engines 2 under each wing. 2 struts 8 wheels 4 wheels per strut. This is Airbus's response to the 777. Along with others, it seems that Boeing makes A class and Airbus just makes A close copy Seats wise.



A330 & A340. Same wing and fuselage, different number of engines.

A330 2 struts. 8 wheels. 4 wheels per strut. 2 engines 1 under each wing. The flap lets it extend up from the end of the wings. New engine option in the wings.



Current engine options A321, A320, A319, and A318 2 struts. 8 wheels. 4 wheels per strut. 2 engines 1 under each wing. Most comments on shorter routes like BOS - MCO. Neo A321, A320, A319. The fuselage is wider than other single-aisle aircraft. The A318 tail is taller than the rest of the family. Original design winglets go up and down.



*American Airlines Livery

MCDONNELL DOUGLAS (merged with Boeing in 1997)

2 struts. 4 wheels. 2 wheels per strut. MD-80\MD-90 T-tail engines on tail 2 engines Eyebrow windows. 717 is the same but shorter.



*Delta Livery

REGIONAL JETS

Smaller jets are popular on shorter routes like island hopping.

Ember: E-190/ E-170 engines on wings but noticeably smaller. 2 struts. 4 wheels. 2 wheels per strut. Pointy nose like other RJ's but no T-tail winglets

Erg -145 -135LR-140 -145LR/ cry 700

BOEING

747 “the whale.” The first-class upper deck makes a very distinctive hump... if it has a hump it must be a 747. 4 engines 2 under each wing. The 400 series has winglets. Main landing gear 4 struts. 16 wheels. 4 wheels per strut. 747-8 has scalloped nacelle edges. Shown here is a 747-8. The 747 is the only 2 deck aircraft still in production. Except other than other models of itself. Like the -400,7 so on. This aircraft is retiring in 2022 due to low sales and demand. It



The 777 is Boeing's largest twinjet. In the wings 777x. The longest range commercial airplane. Tail cone ends in a flat blade shape. 2 struts. 12 wheels. 6 wheels per strut.



767 & 777 look the same. 777 is bigger.

767 wide-body, 2021 variant of the 757. Rounded tail cone 2 salutes. 8 wheels. 4 wheels per strut. Not all 767's have winglets.



787 Dreamliner. Larger windows. Main landing gear 2 struts. 8 wheels. 4 wheels per strut. 4 cockpit windows. One-piece fuselage. Scalloped nacelle edge for noise reduction. Curved swept wings with raked (angled) wingtips. It uses the most composite materials of any commercial airliner. It is the seed for the 777X.



737: classic -300/-400/-500 has shorter wings & may not have winglets 737: Next Generation -600/-700/-800/-900. 737 MAX new! -7/-8/-9/-10. The 737 is the most produced passenger jet 9,482 since 1967. Pointy nose. Large blended winglets on most next-gen and some classics. Main landing gear 4 wheels 2 struts 2 wheels per strut. The tail fin edge has two angles. Val inlet engines sit close to the ground. “split similar” becomes more prevalent in the next generation. Max clues: “AT” advanced technology winglets and scalped nacelle edge.



757 rounded tail cones may have large blended winglets. Main landing gear 2 struts. 8 wheels. 4 wheels per strut. The plane appears longer and thinner than other twin jets, and also appears to sit high off the ground.



How to be A pilot. Here are first first-class tips to become A great pilot:
 (1) Get A 4-year degree in anything; (2) A nearby urban area; (3) And a loan of USD 5,000-16,100 at \$200hr.approx; and (4) Lots of perseverance to the subject and lots of focus into one thing for hours on end. ([The free online pilot school](#))

Now it's time for Spectacular Specs!

Model	#/Seats	Seating	speed/MPH	range/statute miles
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AIRBUS

A318	107-132	3-3	530	3,680
A319	124-156	3-3	530	4,225-4,830

A320	150-180	3-3	530	3,795-4,225
A321	185-220	3-3	530	3,680-4,225
A330	253-440	2-4-2	550	7,015-8,338
A340	295-475	2-4-2	560	8,395-10,350
A350 XWB	270-440	3-3-3	560	8,970-9,488
A380	525-853	3-4-3	560	9,775

BOEING

717	106	2-3	504	1,644-2,370
737	108-215	3-3	520	2,610-3,960
747	345-628	3-4-3	555	6,100-9,200
757	200-280	3-3	530	3,900-4,490
767	216-409	2-3-2	530	4,430-7,340
777	305-451	2-5-2	555	6,030-10,800
787	242-375	3-3-3	561	8,880-9,780

MCDONNELL DOUGLAS

MD-80	130-172	2-3	504	1,800-2,880
MD-90	153-172	2-3	504	2,400-3,200

REGIONAL AIRCRAFT

CRJ series	70-78	2-2	515	1,400-1,730
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ERJ series	37-50	1-2	515	1,780-2,300
E-170/190	70-124	2-2	540	2,300-2,760

RADAR

With Airplanes in the sky, You can go almost anywhere on land and you could find an airplane within a 100-mile radius. With modern technology, You can know an aircraft is coming long before you see or hear it.

Now Lets Head to the Parts Depot

- Radar finding things
- Wings keep us in the air
- Fuselage keeps us alive
- The cockpit controls the plane
- And others!

Works Cited

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Airbus Home

"Airbus Home". *Airbus*, 2021, [Airbus - Home - Aerospace pioneer](#). Accessed 7 June 2021.

Fly8MA

"Course Selection". *Fly8MA*, 2021, [FLY8MA Flight Training | Private Pilot IFR Commercial Pilot Ground School](#) Accessed June 7, 2021.

Boeing: The Boeing Company

"Boeing: The Boeing Company ". Boeing, 2021, [Boeing: The Boeing Company](#). Accessed 7 June 2021.

Lockheed Martin Corporation

"Lockheed Martin Corporation". *Lockheed Martin*, 2021, [Lockheed Martin Corporation | Lockheed Martin](#). Accessed 7 June 2021.

NASA

"National Aeronautical and Space Administration". *NASA*, 2021 <https://www.nasa.gov/> Accessed 7 June 2021.

DOD

"Department of Defense". *DOD*, 2021 [US Department of Defense](#) Accessed June 7, 2021

FAA

"Federal Aviation Administration". *FAA*, 2021, [Federal Aviation Administration](#) Accessed June 7, 2021

DOT

"Department of Transportation". *DOT*, 2021, [U.S. Department of Transportation](#) Accessed June 7, 2021

NTSB

"National Transportation Safety Board" *NTSB* 2021 <https://www.nts.gov/Pages/default.aspx> Accessed June 7, 2021
And Thank you to everyone who helped make this piece possible.