MARY JACKSON

In 1958, Mary Jackson became NASA's first black female engineer, after petitioning to attend an all-white engineering program in Virginia. The same year, she co-authored her first report, Effects of Nose Angle and Mach Number on Transition on Cones at Supersonic Speeds. She broke cultural and race barriers to become the only black female aeronautical engineer in the field and inspired generations of women to pursue STEM fields.

Her work focused on analyzing flight data and studying aerodynamics, helping advance NASA's mission to send astronauts to space. Jackson also contributed to understanding the behavior of *boundary layers*—the thin layer of air closest to the surface of an aircraft. Managing the boundary layer is crucial for reducing drag and improving aerodynamic performance. Her research was directly applicable to designing spacecraft and jets that could handle high-speed travel, which was critical for both military and commercial aviation during that era.

After 34 years at NASA, Jackson moved into management to help improve diversity and inclusion within the organization. Her legacy was highlighted in the book and film *Hidden Figures*, which shed light on her crucial role, alongside colleagues Katherine Johnson and Dorothy Vaughan, in advancing the U.S. space program. Throughout her career, Jackson mentored young engineers, advocating for equal opportunities and encouraging minority women in STEM fields. In 2021, NASA honored her by renaming its Washington, D.C., headquarters the Mary W. Jackson NASA Headquarters.

"Doubt kills more dreams than failure ever will"

Born in 1921 in Hampton, Virginia, she excelled academically, earning degrees in mathematics and physical sciences. Jackson joined NASA's predecessor, the National Advisory Committee for Aeronautics (NACA), in 1951 as a "computer" — a term for women who performed complex calculations by hand. Her work was essential in analyzing data from wind tunnel and flight tests, which helped advance aircraft design. Her research contributed significantly to understanding the behavior of different wing shapes, making flight safer and more efficient.

One of her key technical focuses was on how airflow behaved around different shapes, especially wing designs. In her role, she conducted wind tunnel tests and interpreted the results to find ways to reduce drag (the resistance an aircraft faces while moving through the air) and increase lift (the force that allows an aircraft to stay in the air). These principles are essential for achieving faster, more fuel-efficient, and stable flight

More Information: Aerodynamics   Mary Jackson   NACA

Experiment: Exploring Aerodynamics with Paper Airplanes

What You Need

- Sheets of paper
- Scissors & Tape
- A ruler or measuring tape
- A stopwatch (or phone timer)
- A fan (optional for added wind effect)

Fold Paper Airplanes: Make different models (e.g., dart, glider) to explore how shapes affect flight.

Test Flight Distance, Stability, and Air Time: Throw each plane from the same spot, measure how far they travel, and record distances. Time each flight to see which plane stays airborne longest and most stable.

Optional Wind Test: To simulate wind resistance and observe how it affects each plane's flight path. Compare results to see how shape, stability, and distance relate to aerodynamics, like Mary Jackson's work.

The lift (L) and drag (D) forces can be approximated by the following equations:

$$L = \frac{1}{2}\rho v^2 C_L A$$

$$D = \frac{1}{2}\rho v^2 C_D A$$

Where: - ρ is the air density, - v is the velocity of the airplane, - CL is the lift coefficient (depends on the angle of attack and shape), - CD is the drag coefficient (depends on the plane's shape and surface roughness), - A is the wing area. Planes with higher CL and larger A (e.g., gliders) should stay in the air longer due to higher lift. Planes with lower CD (e.g., streamlined dart shapes) will experience less drag and may travel farther.

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