

MAKING HISTORY AT NASA

KATHERINE JOHNSON, DOROTHY VAUGHN AND MARY JACKSON



THE SPACE RACE TO THE MOON

5th Grade Science

- Strand II: Content of Science
- Standard III: Earth and Space Science: Understand the structure of the Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth's systems.
- 5-8 Benchmark 1: Describe how the concepts of energy, matter, and force can be used to explain the observed behavior of the solar system, the universe and their Structures.
- 3. Know there have been manned and unmanned journeys to space and the moon.

6th and/or 8th GRADE SCIENCE

- Strand III: Science and Society
- Standard I: Understand how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.
- 5-8 Benchmark: Explain how scientific discoveries and inventions have changed individuals and societies.
- Performance Standard 1 [6th grade]: Examine the role of scientific knowledge in decisions (e.g., space exploration, what to eat, preventive medicine and medical treatment).
- Performance Standard 3 [8th grade]: Describe how technological revolutions have significantly influenced societies (e.g., energy production, warfare, space exploration).

HIGH SCHOOL SCIENCE

- Strand III: Science and Society
- Standard I: Understand how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.
- 9-12 Benchmark I: Examine and analyze how scientific discoveries and their applications affect the world, and explain how societies influence scientific investigations and applications.
- Grade 9-12. Science and Individuals.
- Performance Standard 17. Identify important questions that science can not answer.
- Grade 9-12. Science and Individuals.
- Performance Standard 18. Understand that scientists have characteristics in common with other individuals (e.g., employment and career needs, curiosity and desire to perform public service).

SAMPLE DIGITAL LESSON PLAN

5th, 6th, 8th grade or High School Science

Making History at NASA: Katherine Johnson, Mary Jackson and Dorothy Vaughn

The Space Race To The Moon



Making History at NASA

- Introduce the lesson about how scientific discoveries are influenced by individuals and their applications affect the world.
- Students watch HIDDEN FIGURES film clip
[Drama/History 2016 Rated PG].
- Students read the page about Katherine Johnson, watch the short biography video by National Geographic [5:20 minutes] about her and answer the Question. Discuss as a class.
- Students read the page about Mary Jackson, watch the short biography video by NASA [1:31 minutes] about her and answer the question.
Discuss as class.
- Students read the page about Dorothy Vaughn, watch the short biography video by MSNBC [50 seconds] about her and answer the question.
Discuss as a class.
- Allow at least 2+ class periods.
- Optional activities and resources such as making a moon crater.

STUDENTS WATCH A VIDEO SEGMENT FROM
HIDDEN FIGURES

[Drama/History 2016 Rated PG]

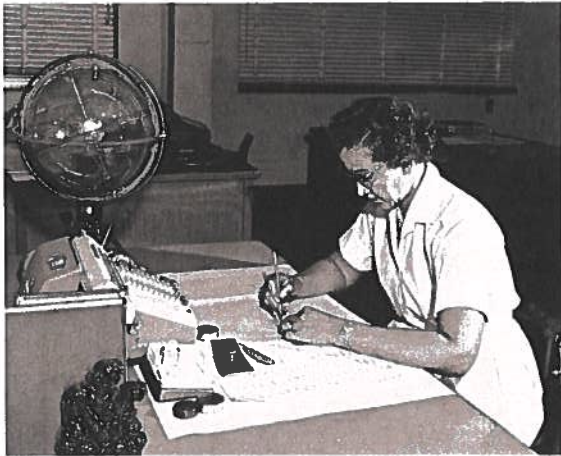
Nasa mathematician Katherine Johnson, Dorothy Vaughn and Mary Jackson cross gender and race lines to help launch astronaut John Glenn into outer space.

<https://youtu.be/RK8xHq6dfAo>

[3:12 minutes]



KATHERINE JOHNSON



American scientist and mathematician whose calculations of orbital mechanics as a Nasa employee were critical to the success of the first and subsequent U.S. crewed spaceflights. Born in 1918, Katherine Johnson was one of the first black students to integrate West Virginia's graduate schools before becoming a NASA mathematician, where she helped send astronauts into Orbit and to the moon and back. She helped calculate flight trajectories for project Mercury and the Apollo programs in the 1960's. She was awarded the Presidential Medal of Freedom in 2015 by President Obama. She was also the 2020 recipient of the Hubbard Medal, National Geographic's highest honor, recognizing a lifetime achievement in research, discovery and exploration.

WATCH NASA TRAILBLAZER - NATIONAL GEOGRAPHIC [5:20 minutes]

https://youtu.be/E4j_LpKzcZQ

Give one example of how Katherine Johnson contributed to the success of the first and subsequent US crewed spaceflights. Discuss as a class.

MARY JACKSON



American scientist, mathematician and aerospace engineer. In 1958, she became NASA'S first African American female engineer. She was one of a small group of African American women who worked as aerospace engineers, called "human computers" at NASA during the Space Age. She helped calculate flight trajectories for project Mercury and the Apollo programs in the 1960's. Along with playing a vital role in the development of the Space Program, she helped other women and minorities advance their careers. At NASA, she developed expertise working with wind tunnels and analyzing data on aircraft flight experiments.

NASA Names's Headquarters After Engineer Mary Jackson [1:31 minutes]

<https://youtu.be/ILDtnvuSTSo>

Give one example of how Mary Jackson contributed to NASA as an engineer.
Discuss as a class.

DOROTHY VAUGHN



American mathematician and human computer who worked for the National Advisory Committee for Aeronautics [NACA], and NASA, at Langley Research Center in Hampton, Virginia. In 1949, she became acting supervisor of the West Area computers, the first African American woman to supervise a group of staff at the center. She worked on the SCOUT Launch Vehicle Program that sent America's first satellite into space. SCOUT is one of the nation's most successful and reliable launch vehicles, used for launching a 385-pound satellite into 500-mile orbit. She also computed the flights of launch vehicles.

MSNBC In honor of Black History Month We are Celebrating a Monumental American: Dorothy Vaughn [50 seconds]

<https://www.msnbc.com/velshi-ruhle/watch/nasa-mathematician-dorothy-vaughn-is-a-monumental-american-1154879043734>

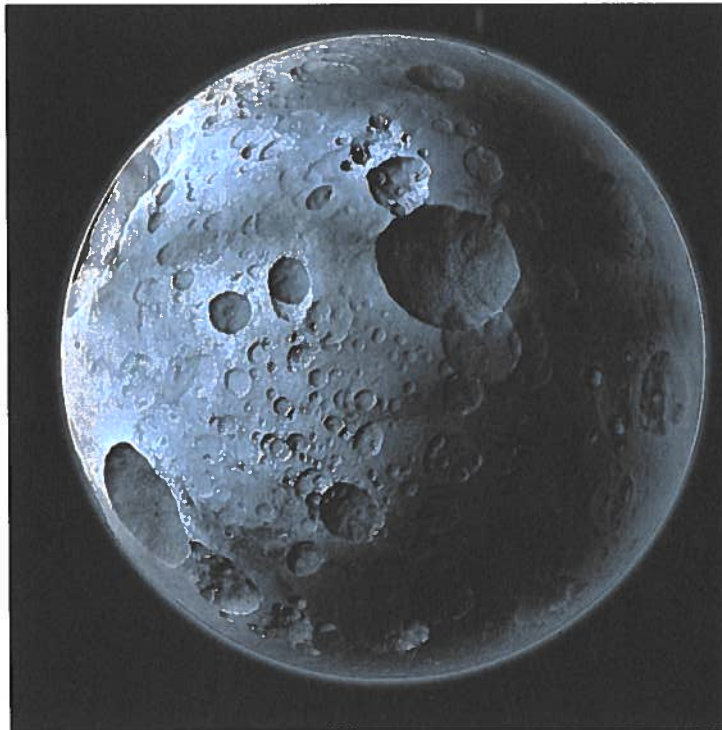
Give one example of how Dorothy Vaughn made history at NACA and/or NASA.
Discuss as a class.

OPTIONAL ACTIVITIES AND RESOURCES

1. Students design and create a 3-D model of the moon or a moon crater.

<https://lunar.gsfc.nasa.gov/lessonkit/LROC-Making%20a%203D%20Model%20of%20the%20Moon.pdf>

<https://www.jpl.nasa.gov/edu/learn/project/make-a-moon-crater/>



2. Write a short essay or speech as Katherine Johnson, Mary Jackson or Dorothy Vaughn as if they were speaking today to an audience at NASA. Discuss how their scientific, mathematical, engineering or computing work affected the world as well as future scientific discoveries [300 -500 words].

3. You have won a ticket with Virgin Galactic sweepstakes to travel into the edge of SPACE on a commercial flight from the SpacePort in New Mexico as a civilian. Compare and contrast the pros and cons of going into outer space. Make a foam board to present to the science class. Consider the benefits and drawbacks. What are the health risks? Would you take the ride or not? Are medical treatments needed?
<https://www.engadget.com/virgin-galactic-omaze-space-flight-sweepstakes-192418183.html>

4. Visit SPACEPORT AMERICA as a class in Truth or Consequences, New Mexico in the middle of the desert. Go on a private tour of this active test facility. Imagine sitting in the cockpit of a space vehicle and launching from two-mile long runway in the middle of a New Mexico desert. Imagine the heart-pounding, dizzying effect of weightlessness in outer space. <https://www.spaceportamerica.com/visit/>