I AM
EDUCATIONAL SERIES

Dorothy Vaughan: Hidden Figure

Objectives:

By the end of the lesson, students will be able to:

1. Know that Dorothy Vaughan:

   a) Was a respected mathematician who became the first African American and one of the first women to become a manager at the National Advisory Committee for Aeronautics (NACA)

   b) Became an expert at Fortran, a computer programming language used for scientific and algebraic applications and taught other women so that they received the pay and recognition they deserved.

   c) Possessed good character traits that helped her achieve a successful career at NACA.

Materials Needed:

1. YouTube clip of Doughty Vaughan 2:19 minutes: [Hidden Stories: Dorothy Vaughan - YouTube](#)
2. Art supplies to make a portrait or photo collage.

Vocabulary

- Hardworking
- National Advisory Committee for Aeronautics (NACA)
- West Area Computing
- Jim Crow Laws
- Segregated
- Character Traits

Subject Area: Black History, Social Studies, Women's History, Career Exploration

Bloom Taxonomy	Affective Domain	Gardner's Multiple Intelligences
- Knowledge - Understanding - Application - Analysis	- Receiving - Responding - Valuing - Organizing	- Audio - Linguistic - Interpersonal

Background on Dorothy Vaughan

- Dorothy Vaughan was born September 20, 1910, in Kansas City, Missouri and died on November 10, 2008.

- When Dorothy was seven, her parents, Leonard, and Anne Johnson, moved the family to Morgantown, West Virginia.

- In 1925, Dorothy graduated from Beechurst High School and after four years she graduated with a Bachelor of Science from Wilberforce University in Ohio.

- In 1932, Dorothy married Howard Vaughan and spent the next eleven years as a math teacher and a homemaker in Farmville, Virginia.

- In 1943, Dorothy and her family moved to Newport News, Virginia where she started a historical career as a mathematician at the National Advisory Committee for Aeronautics (NACA).

- **The National Advisory Committee for Aeronautics (NACA)** and the **West Area Computers** were segregated which mandated the Black women to use separate bathrooms and dining facilities.

- In 1949, Dorothy became the first African American to become a manager of the West Area Computers.

- Then in 1958, Dorothy joined the new Analysis and Computation Division and became an **expert FORTRAN programmer**. She also worked on the SCOUT (Solid Controlled Orbital Utility Test) Launch Vehicle Program which was one of the nation's most successful and reliable launch vehicles, used for launching a 385-pound satellite into a 500-mile orbit (Biography).

- Also, at NACA, Dorothy became a devoted advocate for female employees who deserved promotions.

- Dorothy retired from NASA (previously named NACA) in 1971. She died November 10, 2008, in Hampton, Virginia.

Background on National Advisory Committee for Aeronautics (NACA)
- National Advisory Committee for Aeronautics (NACA) was established in 1915, 43 years before NASA.

- The role of NACA was to conduct aeronautics research, conduct experiments, and perform flight tests and simulations which led to major efforts and contributions in both World War I and World War II.

Source**: https://www.nasa.gov/ames/the-national-advisory-committee-for-aeronautics**

West Area Computers
- The **West Area Computing unit was a group of Black women who manually performed complex mathematical calculations for the program's engineers**.

- These Black women were known as West Computers. **These women analyzed test data and provided mathematical computations that were extremely necessary for the early U.S. space program.**

Source: https://www.britannica.com/biography/Katherine-Johnson-mathematician

Introduction/Motivation:

- Introduce students to a **Word Web** (an example is provided) and demonstrate how it is used.
- Write, "**hardworking**" in the middle of the **Word Web** and have students identify examples. Tell them examples of, "hardworking" could be a person or a thing. This activity can be done together, in groups of individually. ("Hardworking" can be changed to any word from the **Character Development Table** provided.)
- For online learning, send the Word Web to students **prior** to the lesson. Through Zoom Pro, breakout sessions can be used to complete the activity in groups.
- Once students have completed the activity, have them **share their examples** and the details of why they believe what they selected as, "**hardworking**".
- This activity **will help you learn more about your students** as they share what or who they believe in their lives is, **"hardworking**".
- Tell students that today, we are going to learn about a woman who is considered, **"hardworking"** because she became the first African American and one of the first women to become a manager at the National Advisory Committee for Aeronautics **(NACA)**. She also learned a computer language called Fortran, became the best at it and taught other women how to understand it.   This woman is **Dorothy Vaughn**.

For older students:

- Ask students, "**What do think is the best job in America**?"
- List students' responses. If the class is online,
    - Use Breakout sessions in Pro Zoom to have students agree on what they think are the 3 best jobs in America.
    - Teacher will ask students the question and give students 2-5 minutes to add their responses in the chat in Zoom.
    - Students share their response as a student is recruited to capture responses.
- Once student's responses are given, share/display the **20 Best Jobs in America worksheet** provided.
- Lead students to the top 3 best jobs in America and discuss the careers and the salaries.
- Share with students that one of the leading best jobs in America are in the **STEM fields, science, technology, engineering, and math**.
- Tell students that today, we are going to learn about a woman who earned a successful career in the **STEM field**, had a job labeled as one of the best jobs in America, became the first African American and the one of the first women to become a manager at the National Advisory Committee for Aeronautics (NACA). She also and became an expert at Fortran, a computer programming language used for scientific and algebraic applications. This woman is **Dorothy Vaughn**.

Body

Art Project# You Can be Anything You Want to Be!

Step 1#

- Introduce students to Dorothy Vaughn through watching the **YouTube clip provided**.
- Review the script and highlight key points:
    - Dorothy loved math and was good at it.
    - Worked in the West Area Computers unit, a segregated area for African American women mathematicians, to help put the first man on the moon.
    - Dorothy and the other women did the math by hand.
    - Dorothy taught herself Fortran, a computer programming language, and taught other women too.
    - Because of Dorothy, more women of color can work in the science field.
- Have students create a drawing, portrait, or photo collage of Dorothy. Students can paint, draw, color, or use construction paper or printed photos to display her face and body.

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- Students should also identify and add character traits such as, **"hardworking"** that Dorothy possessed, using the **Career Development** Sheet provided, to the project. A sample is provided.
- Students should also present their projects.

Step 2# Who Will You Help?

- Share with students that, "Dorothy Vaugh helped women of color work in the science field and become a mathematician, a programmer or even an astronaut."
- Have students share who they want to be when they get grow up.
- As students describe what they want to be, ask them, "**Who will you help in that job/career?"**
- Remind students that **Dorothy helped women by teaching them Fortran**, the computer programing language, and made sure that they women received the recognition and pay they desired.
- Have students add, "Who will you help?" to their project by completing the **How Can You Help** Worksheet provided.

Activity 2 for Older Students

- Share with students that, "**Dorothy Vaughn helped** women of color have successful careers in **STEM**.
- Ask students if they know someone who works in the **STEM fields**.
- Tell students that working in STEM field is a great way to help people. Show **YouTube video** 2:52 minutes STEM Careers Possibilities | Grand Canyon University - YouTube
- Review details of the video and help students recognize how careers in STEM greatly impact our lives.
- Have students choose one of the **20 Best Jobs in America** research how it helps people.
- Students should produce the research through a PowerPoint, Prezi, Video, or another visual aid.
- Students should present the research.

Links:

Dorothy Vaughan: [Dorothy Johnson Vaughan - Education, Early Life & Family - Biography](#)

About Dorothy Vaughan 2:20 minutes [Hidden Stories: Dorothy Vaughan - YouTube](#)

Dorothy Vaughan Hidden Figures Movie Clip 2:01 [Library Scene-Dorothy Vaughn Hidden Figures - YouTube](#)

What is good character? https://talkingtreebooks.com/teaching-resources-catalog/definitions/what-is-character-definition.html

Character Development Table	
Good	**Bad**
Courteous	Impolite
Determined	Unsure
Friendly	Unfriendly
Hard-working	Lazy
Humble	Proud
Generous	Selfish
Punctual	Late
Respectful	Rude
Brave	Coward
Loyal	Rebellious
Perseveres	Gives up easily
Considerate	Inconsiderate
Honest	Dishonest
Kind	Mean
Sincere	Insincere

Source: https://www.pinterest.com/pin/69172544252713762/

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20 BEST JOBS IN AMERICA

1. Front End Engineer
Job Satisfaction Rating: 3.9 / 5
Number of Job Openings: 13,122
Median Base Salary: $105,240

2. Java Developer
Job Satisfaction Rating: 3.9 / 5
Number of Job Openings: 16,136
Median Base Salary: $83,589

3. Data Scientist
Job Satisfaction Rating: 4.0 / 5
Number of Job Openings: 6,542
Median Base Salary: $107,801

4. Product Manager
Job Satisfaction Rating: 3.8 / 5
Number of Job Openings: 12,173
Median Base Salary: $117,713

5. DevOps Engineer
Job Satisfaction Rating: 3.9 / 5
Number of Job Openings: 6,603
Median Base Salary: $107,310

6. Data Engineer
Job Satisfaction Rating: 3.9 / 5
Number of Job Openings: 6,941
Median Base Salary: $102,472

7. Software Engineer
Job Satisfaction Rating: 3.6 / 5
Number of Job Openings: 50,438
Median Base Salary: $105,563

8. Speech Language Pathologist
Job Satisfaction Rating: 3.8 / 5
Number of Job Openings: 29,167
Median Base Salary: $71,867

9. Strategy Manager
Job Satisfaction Rating: 4.3 / 5
Number of Job Openings: 3,515
Median Base Salary: $133,067

10. Business Development Manager
Job Satisfaction Rating: 4.0 /5
Number of Job Openings: 6,560
Median Base Salary: $78,480

Source: Best Jobs in America | Glassdoor

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11.**Nursing Manager**
Job Satisfaction Rating: 3.7 / 5
Number of Job Openings: 12,320
Median Base Salary: $85,389

12. **HR Manager**
Job Satisfaction Rating: 4.1 / 5
Number of Job Openings: 3,966
Median Base Salary: $83, 389

13**. Operations Manager**
Job Satisfaction Rating: 3.8 / 5
Number of Job Openings: 19,198
Median Base Salary: $70,189

14. Salesforce Developer
Job Satisfaction Rating: 4.2 / 5
Number of Job Openings: 3,639
Median Base Salary: $81, 175

15. **Finance Manager**
Job Satisfaction Rating: 3.8 / 5
Number of Job Openings: 4,091
Median Base Salary: $120,644

16. **Accounting Manager**
Job Satisfaction Rating: 4.0 / 5
Number of Job Openings: 3,589
Median Base Salary: $85, 794

17. **Program Manager**
Job Satisfaction Rating: 3.6 /5
Number of Job Openings: 19,280
Median Base Salary: $87, 005

18. **Applications Engineer**
Job Satisfaction Rating: 3.7 / 5
Number of Job Openings: 9, 550
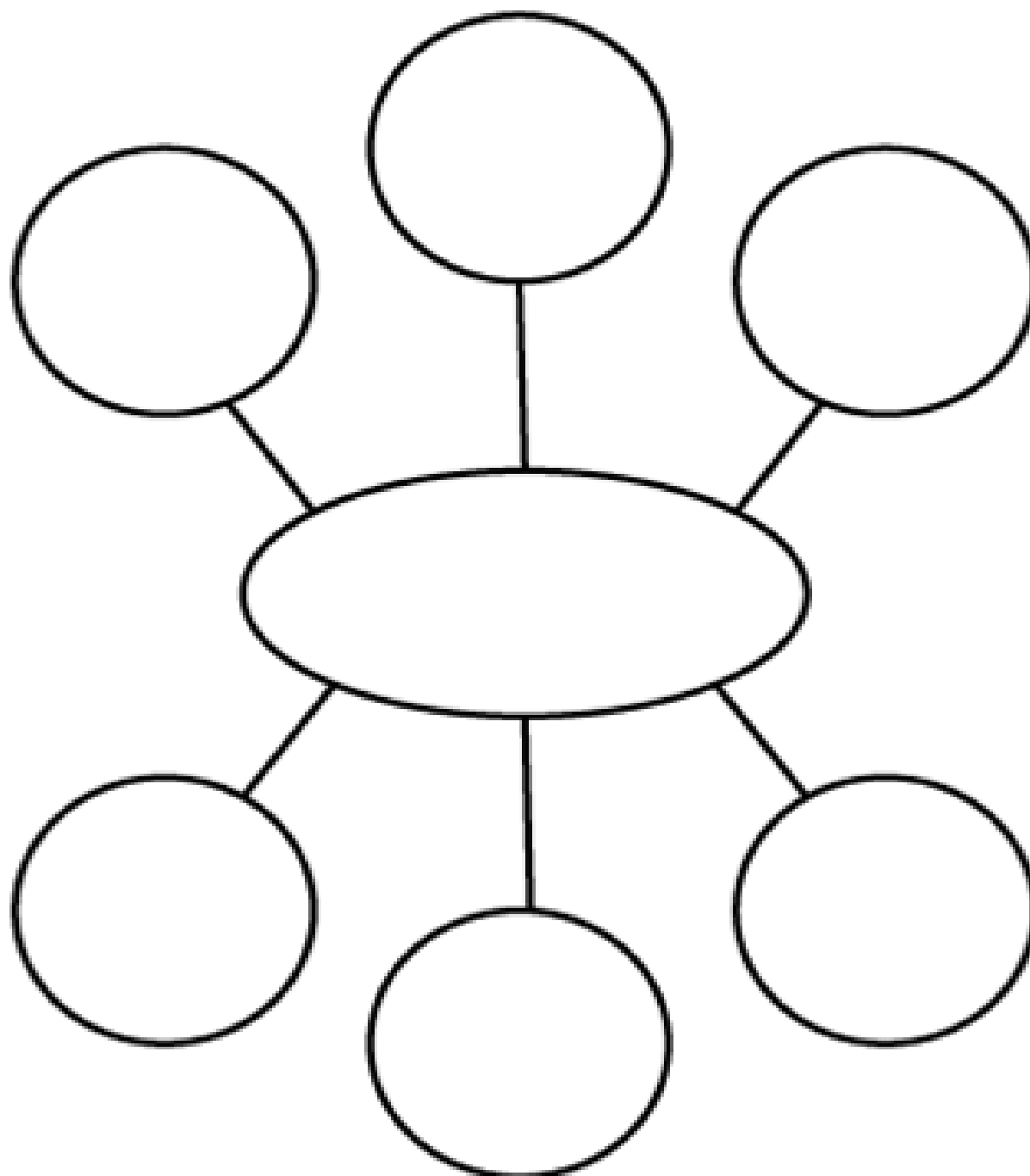Median Base Salary: $76, 854

19. **Clinic Manager**
Job Satisfaction Rating: 3.9 /5
Number of Job Openings: 5,768
Median Base Salary: $70, 000

20. **Physical Therapist**
Job Satisfaction Rating: 3.6 / 5
Number of Job Openings: 28, 886
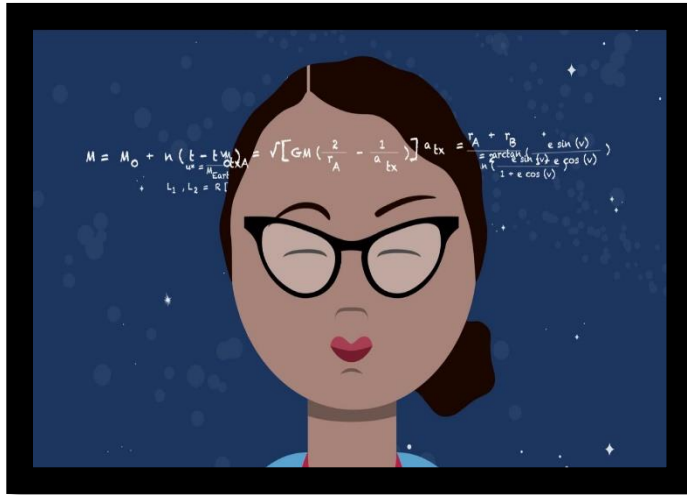Median Base Salary: $71, 483

Source: Best Jobs in America | Glassdoor

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Word Web

Source:

www.iameducationalseries.org

Dorothy Vaughn

[Hidden Stories: Dorothy Vaughan - YouTube](#)

Script 2:19 minutes

- When you think of the people who helped Americans get into space, you probably don't think of someone who looks like me.
- Hi! I'm Dorothy Vaughn. I love math and I was good at it.
- So, when I saw an ad for a mathematician job at NACA, I knew I couldn't pass it up.
- NACA was trying to attach rockets to airplanes, something no one had ever done before.
- They put me in the West Area Computing unit, an all-African American group of brilliant women mathematicians.
- Because of Virginia's Jim Crow Laws, we were segregated from other parts of NACA, even though we were just as smart and as talented as anybody else.
- Not only did we work in separate offices, we had separate bathrooms, we sat at the lunch table in back of the cafeteria labeled colored.
- Most folks didn't even know we existed, but our calculations helped send satellites to space and put a man on the moon for the first time in history.

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- And get this, we did all those calculation by hand, we were called computers.
- No, not whatever machine you're using to watch this. Human computers.
- Still, some people didn't take us seriously.
- After all, the year before I started working at NACA, African American women weren't even allowed to work in the lab.
- We definitely weren't allowed to be supervisors.
- After a few years, I began leading the West Computers Unit.
- In 1951, I became the first African American supervisor in NACA's history.
- I knew I couldn't be a computer forever though.
- Eventually, electronic computers would replace us, so I taught myself a program language name Fortran.
- I taught other women Fortran too and made sure they got the pay and promotions they deserved.
- Of course, I was one of the many women who paved the way for women in color to work in science.
- NACA desegregated in 1959 and while things are perfect, no matter who you are you can be anything you want to be from a mathematician, to a programmer to an astronaut as long as you do your math homework.

Art Project Example
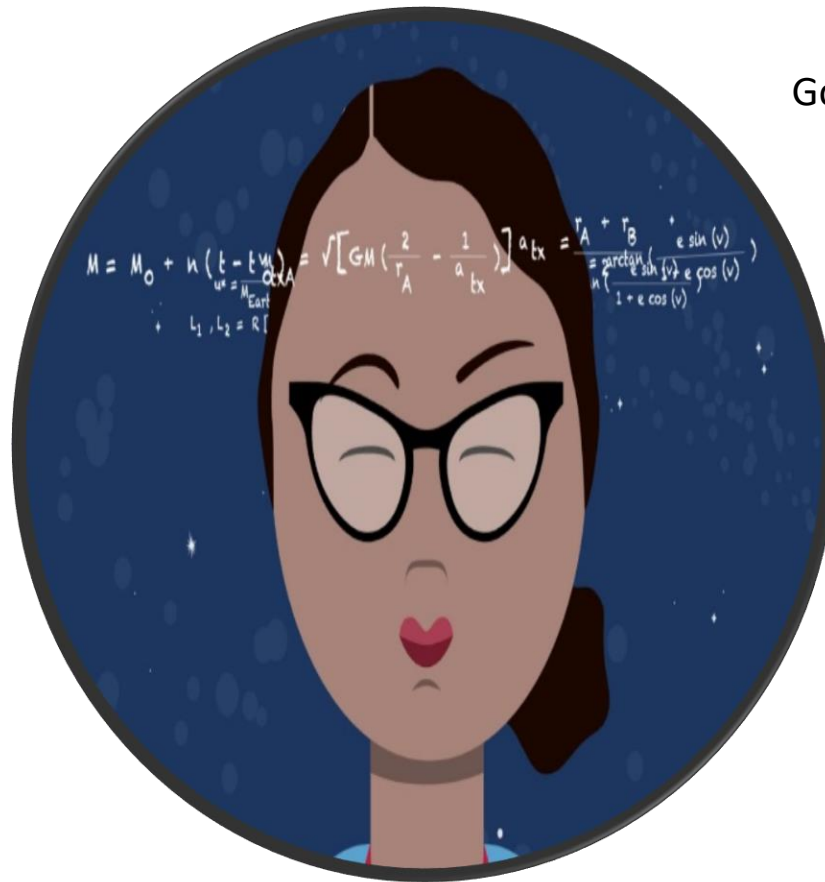
Hardworking

Good at math.

Worked at NACA.

Supervisor

Generous
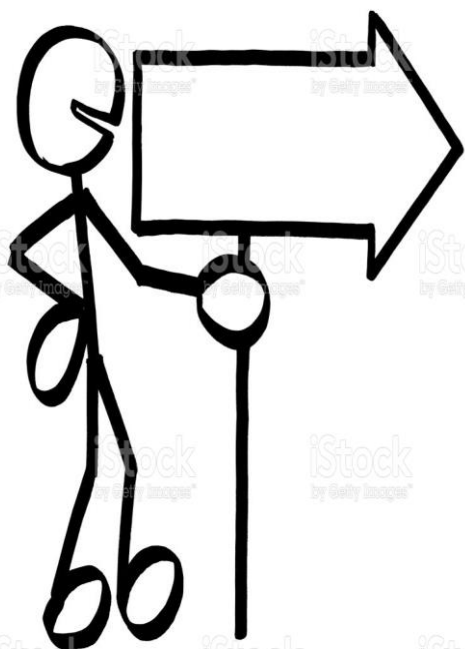
Worked in West Area Computers Unit

Very smart

Patience

Teacher

Helpful

Loves math.

Thoughtful

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HOW
CAN YOU
HELP?

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