

A **FREE** RESOURCE FOR TEACHERS!

# HIDDEN FIGURES

## Level 3

This level is suitable for students who have been learning English for at least three years and up to four years. It corresponds with the Common European Framework level B1. Suitable for users of TEAM magazine.

### SYNOPSIS

The 'hidden figures' in this book are Mary Jackson, Katherine Johnson and Dorothy Vaughan, three African-American women who were brilliant mathematicians. They played a crucial role in the US aircraft building programme that helped to win the Second World War, and then in the space programme that landed the first man on the moon. Without their calculations, the course of events in the twentieth century might have been very different.

We follow the lives of these three women through the dramatic events of the mid-twentieth century as they blaze a trail for women and for African-Americans. The women gained top degrees in mathematics at a time when most mathematics and science graduates were white men. The women were all from the Southern states of the US. At that time, in some Southern states, like Virginia, there was segregation, meaning that black and white people were not treated equally. The demands of the Second World War started to change all that, when America needed all of its brainpower and physical power – regardless of race or gender – to help the world defeat Nazi Germany.

This reader also explores some of the science and engineering behind the aeronautical and space discoveries and milestones of the time – the science of flight, breaking the sound barrier, orbiting the earth, the Mercury Project and the Apollo moon missions. Students can also read about the cultural background to the story, with information on the Jim Crow laws, the American Civil War and the Civil Rights movement. Finally, the Fact File looks forward to the future of space exploration.

### THE BACK STORY

This non-fiction reader is based on the book *Hidden Figures* by Margot Lee Shetterly. Historian Margot Lee Shetterly grew up in Hampton, Virginia. The daughter of a NASA research scientist, Shetterly knew some of the women in the story when she was growing up and did many years of research to bring together this untold story.

Shetterly's book inspired the popular film *Hidden Figures*, starring Taraji P. Henson as Katherine Johnson, Octavia Spencer as Dorothy Vaughan and Janelle Monáe as Mary Jackson. The film draws the separate life stories of the women into one fictionalised story.

### MEDIA LINKS

**DVD:** The film *Hidden Figures*, available on DVD and subscription video, was released in 2016 and lasts 126 minutes. It features music by Pharrell Williams and Janelle Monáe.

**CD:** A recording of *Hidden Figures* accompanies the Scholastic Reader.

**Internet:** For more information about writer Margot Lee Shetterly, go to her website: [margotleeshetterly.com](http://margotleeshetterly.com)

## HOW TO USE YOUR SCHOLASTIC READER

### Choosing and motivating

Is this the right story for your class? Are your students interested in social history, science and the space race? Have they seen the film of *Hidden Figures*? Spark their interest by showing the trailer for the film, which is available on YouTube.

### Organising

Plan a class reading schedule. Decide how many pages to set for reading each week. Select exercises from the Self-Study section at the back of the reader and extra activities from this resource sheet to go with each chunk of reading. All answers are on pages 4 & 5 of this resource sheet.

### Using the CD

Students can listen and follow in their books. They can listen and then read. They can read and then listen. All these activities will improve their reading speeds and skills.

### Glossary

Go to 'New Words' at the back of the reader. Translate the words with the class or get students to find meanings at home. The Vocabulary Builder on page 4 of this resource sheet practises the new words in a different context.

### Fact File

Set this as self-study or use for whole class work. It looks at the race to Mars, discussing the Martian climate and what life would be like there for humans.

### What did they think?

Get everyone to review *Hidden Figures*. Who liked it? Who didn't? Did you like it? Let us know at:

[elt@scholastic.co.uk](mailto:elt@scholastic.co.uk)

RESOURCE SHEET STUDENT ACTIVITIES



# HIDDEN FIGURES

### People and places

Circle the correct words in *italics*.

- a) People first realised that Katherine Johnson was good at maths when she was at school / *university*.
- b) Mary Jackson studied *physics* / *engineering* as well as maths at university.
- c) Dorothy Vaughan used her maths degree to become a *scientist* / *teacher*.
- d) In 1915, the United States opened the NACA on the coast of *Virginia* / *Florida*.
- e) The US launched its first spacecraft from *Hampton, Virginia* / *Cape Canaveral, Florida*.

### Chapters 1–2

1 Choose the correct answers.

- a) What was Dorothy **not** able to do after the Wall Street Crash of 1929?  
 get a job     study in Washington DC
- b) Which **two** jobs did Dorothy Vaughan have?  
 teacher     cigarette factory worker  
 washerwoman
- c) Where do Dorothy and her young family live?  
 with her husband's parents     with her parents
- d) Why are the buildings at Langley painted green?  
 Because enemy spy planes might see them.  
 Because local people are upset by their size.
- e) Where does Dorothy learn about a job as a mathematician?  
 in a newspaper     in the post office

2 Are these sentences true (T) or false (F)? Correct the false sentences in your notebook.

- a) Newport News is not far from Dorothy's home in Farmville.  
*F. It is 225 kilometres from Dorothy's home.*
- b) Dorothy finds Newport News very different to Farmville.  
 .....

- c) She is unable to find anywhere to stay.  
 .....
- d) She travels by bus for her first day at Langley.  
 .....
- e) There is no Coloured Line on the bus.  
 .....
- f) She starts her new job on D-Day.  
 .....

3 Talk to a partner. Imagine you are African-Americans in Virginia in 1941. The government wants you to fight for the US against Nazi Germany. How do you feel about that?

### Chapters 3–5

1 Complete the sentences with these words. There are more words than you need.

adventures    calculations    engineers    fields    locals  
 pilots    signs    tunnels

- a) Dorothy could see green ... *fields* ..... through her office window.
- b) None of the tables in the cafeteria had ....., except one.
- c) Many of the ..... in Hampton thought the NACA scientists were strange.
- d) Many ..... died in the early days of flight testing.
- e) The black newspapers ran stories about the ..... of the Tuskegee airmen.
- f) Dorothy worked on the ..... to improve the Mustang planes.

2 Read 'Aerodynamics: How does a plane fly?' (page 19). Match these words to their definitions.

- |           |  |
|-----------|--|
| a) forces | i) This pulls the plane to the ground.                                     |
| b) weight | ii) This makes the plane move forward.                                     |
| c) lift   | iii) This slows the flying object down.                                    |
| d) drag   | iv) Four of these are needed for flight.                                   |
| e) thrust | v) This is caused by the difference in pressure above and below the wings. |

3 Answer the questions in your notebooks.

- a) Why was it hard for Dorothy to visit her children?
- b) What did she decide to do about it?
- c) What did everyone celebrate on 15th August 1945?
- d) After the war, why did some women continue to work?
- e) Why was Dorothy's house very crowded?
- f) Why did the NACA make Dorothy *Acting Head* of West Computing in 1949?

## RESOURCE SHEET STUDENT ACTIVITIES

### 4 Complete the sentences about Mary Jackson with the correct forms of the verbs.

become   believe   feel   lead   show
---------------------------------------

- a) Mary ..... *felt* ..... angry about the way the white computers spoke to her.
- b) When she was young, Mary dreamed of ..... an engineer.
- c) Mary and her family ..... in helping the community.
- d) Mary ..... the local group of Girl Scouts.
- e) She wanted ..... her Girl Scouts that anything was possible.

### 5 Talk with a partner. In Chapters 3–5 what examples are there of the different way black and white workers were treated at work?

#### Chapters 6–8

##### 1 Correct the mistakes in these sentences.

- a) Katherine’s first job was at a school in <sup>Virginia</sup> ~~West Virginia~~.
- b) Katherine and Jimmy moved to Newport News when their first child was born.
- c) Katherine found the work in West Computing difficult.
- d) She was scared of the free-thinking FRD engineers.
- e) She asked the engineers few questions.
- f) Katherine’s first big job in the FRD led to important changes in aircraft design.

##### 2 Answer the questions in your notebooks.

- a) Where were the Little Rock Nine trying to go? What did the white crowd do there?
- b) What was the name of the world’s first satellite? How long did it take to orbit the earth?
- c) What was the name of the first dog in space? What spaceship did she travel in?
- d) What was the new name for the FRD? What was the first project they worked on?
- e) What happened to the West Area Computers Unit in 1958? What did this mean for Dorothy Vaughan?
- f) Who led the Montgomery bus action and why did it take place?

##### 3 What do you think? Discuss your ideas with a partner.

- a) Look at the photo on page 38. Describe how the people in this picture are feeling and behaving, and why.
- b) The title of Chapter 10 is ‘Get the girl to check the numbers!’ Who is the girl, do you think?

#### Chapters 9–11

##### 1 Write the names.

- a) He walked into Katherine’s life in 1958. ... *Jim Johnson* .....
- b) She was lucky to leave work by 10 pm. ....
- c) He was American and hoping to be the first man in space. ....
- d) He became the first man in space. ....
- e) She trained again and learned how to program computers. ....
- f) He told the world that the United States was planning to land a man on the moon. ....
- g) They wanted the government space programme to move to Houston. ....

##### 2 Choose the correct answers.

- a) What did the space team worry about most?
  - getting an astronaut into space
  - getting the astronaut home again
- b) Why was the date for the launch of Friendship 7 changed?
  - John Glenn wasn’t ready.     There was bad weather.
- c) Who or what did the final check on John Glenn’s orbital path?
  - the IBM computer     Katherine Johnson
- d) Who became an American superstar?
  - John Glenn     Katherine Johnson

##### 3 Answer the questions in your notebooks.

- a) How many black engineers were employed at Langley in the early sixties?
- b) Where did Lieutenant Uhura meet Martin Luther King?
- c) Where did three astronauts die in February 1967?
- d) Which of the Apollo 11 astronauts did not set foot on the moon?
- e) What was the most difficult part of the moon mission?
- f) How long was Apollo 11’s journey back to earth?

#### FINAL TASKS

**1 Choose one of the photographs in the reader. Write a short paragraph to go with the photograph, saying who is in the picture, what is happening and why it is in the news.**

**2 Work in small groups. Imagine you and your family are watching the moon landing on your black and white TV. Describe the event – what you see, how you are feeling, what you are eating, what you say, what you do.**

**3 Choose one of these topics to research further. Give a five-minute talk to your class.**

- the Jim Crow laws
- Laika, the space dog
- the Little Rock Nine
- wind tunnels
- Star Trek

## RESOURCE SHEET STUDENT ACTIVITIES

### VOCABULARY BUILDER

Choose words from page 64 of your reader to complete these sentences.

- The men working at the farm had no personal freedom. They were .....
- There are usually between three and six ..... on the International Space Station at one time.
- Thousands of ..... died on both sides during the Korean War.
- The ..... stood up in church and spoke about modern slavery.
- A team of ..... are designing a new bridge over the River Thames.
- Katherine did the mathematical ..... to work out the trajectory of the module.
- Many European cities were destroyed by ..... in the Second World War.
- The ..... under the river was closed after a crack appeared in the wall.
- The President invited the team to the White House after their ..... in the competition.
- In the latest ..... film, rockets from outer space landed on London.
- US aircraft flew many ..... in Europe and Asia during the Second World War.
- She's studying for a ..... at university in South Africa. As part of the course, she's doing ..... into flight safety.

- A good leader should work as part of a team and not have too much .....
- The ..... of the first manned mission to Mars will be a very exciting event.
- The heavy rain lasted a month and was a ..... for poor people in the valley.
- Every time Jo and Bobby had an argument, the ..... in the office was uncomfortable.
- It's easier to write big numbers in ..... rather than words.

### Casual language

What do the expressions mean? Choose the correct option.

- How's things?  
a) Is everything OK with you? b) How do I do this?
- I gotta get the shopping.  
a) I've got the shopping. b) I've got to get the shopping.
- It's over.  
a) It's finished. b) It's too much.
- You'll fit right in.  
a) This T-shirt is exactly your size.  
b) You'll get on with the people in the team.
- Can I get you folks something to eat?  
a) Can I get you a fork to eat with?  
b) Can I get you guys something to eat?

### ANSWER KEY

#### Resource Sheet Activities

##### People and places

- b) physics c) teacher d) Virginia e) Cape Canaveral, Florida

##### Chapters 1-2

- b) teacher, washerwoman c) with her husband's parents  
d) Because enemy spy planes might see them. e) in the post office
- b) T c) F. She finds a room. d) T e) F. She sits behind the Coloured Line on the bus. f) F. She starts her new job on the day the leaders of the Soviet Union, the US and the UK meet to plan D-Day.
- Open answers.

##### Chapters 3-5

- b) signs c) locals d) pilots e) adventures f) calculations
- b) i c) v d) iii e) ii
- a) Because they lived too far apart. b) She decided to rent a house in Newsome Park. c) The end of the war. d) Because the war has changed the way they saw their lives. e) Because there were only two bedrooms in the house and she rented the second bedroom to a soldier and his wife. f) Because there were no black managers at Langley. There was still segregation in Virginia and the NACA was worried about upsetting local people.
- b) becoming c) believed d) led e) to show
- Open answers.

##### Chapters 6-8

- b) when their girls were eleven, ten and nine (not when their first child was born). c) easy (not difficult)

- d) wasn't scared (not was scared). e) a lot of questions (not few)  
f) air traffic rules (not aircraft design)

- a) They were trying to attend the Central High School in Little Rock. The white crowd screamed and threw bottles at them.  
b) Sputnik 1, 98 minutes c) Laika, Sputnik 2 d) The Space Task Group (STG), the Mercury project e) It was closed. There was no unit for Dorothy Vaughan to manage. f) Martin Luther King. Because Claudette Colvin and Rosa Parks were taken to prison for refusing to give their bus seats to white passengers.
- Open answers.

##### Chapters 9-11

- b) Katherine c) Alan Shepard d) Yuri Gagarin e) Dorothy  
f) President Kennedy g) powerful Texans in government
- b) There was bad weather. c) Katherine Johnson d) John Glenn
- a) five b) at a civil rights meeting c) inside Apollo 1 in a fire on the ground at Cape Canaveral in Florida d) Michael Collins  
e) the meeting between the lander and the waiting command module for the journey home f) three days

### Vocabulary Builder

- slaves 2. astronauts 3. soldiers 4. preacher 5. engineers  
6. calculations 7. bombs 8. tunnel 9. victory 10. science fiction  
11. missions 12. degree, research 13. power 14. launch  
15. disaster 16. atmosphere 17. figures

### Casual language

- 1 a 2 b 3 a 4 b 5 b

## FACT FILE FOLLOW-UP

## THE RACE TO MARS (pages 58–9)

## Comprehension

Students find answers to these questions in the Fact File.

1. How long is a mission to Mars expected to take?
2. How does the atmosphere on Mars compare with the atmosphere on earth?
3. What do scientists want to be able to grow on Mars?
4. Why does Mars look redder than other stars in the night sky?
5. Is a year longer on earth or on Mars?
6. Does it get colder on earth or on Mars?

(Key: 1. six to nine months 2. It's thinner and contains more carbon dioxide. 3. fruit and vegetables 4. Because there is lots of iron in the ground which turns red when it mixes with air. 5. Mars 6. on Mars)

## Speaking: Role play

Students work in small groups to role play the following situation: You are on the way to Mars. You are talking to the other astronauts on board. Talk about what life will be like when you get there. Speculate about the difficulties you will face. Ask each other how you are feeling. You have all brought one special item with you. Explain what it is and why you have brought it.

Useful language:

*I wonder if / whether + will ...      We'll have to ...*  
*There may / could be ...              I wish I'd / I hadn't ...*  
*It's going to be hard to ...*

## Research and write

Students choose one of the other planets in our solar system. They imagine that space agencies around the world have decided to launch a mission to their chosen planet. They research information about their planet and write a Fact File. The NASA website has excellent information and is a good place to start!

## Creative writing

Students write a short story set in a human colony on Mars. They can borrow ideas from films and books they know about the red planet, invent their own plot or use one of the ideas below.

Suggested plot ideas:

- Earth has a colony on Mars. They are expecting a spaceship from earth to land in the next week. A spaceship arrives. It isn't from earth.
- There are two human towns on Mars. They have lived peacefully until now. The leader of one town now wants power over all of Mars and is planning a secret attack. However, a spy from the other town overhears the plan.
- Humans live on Mars. They grow fruit and vegetables to feed themselves. The weather forecast shows a huge storm coming. It may destroy their farms. They have to save themselves.

## DVD/CD FOLLOW-UP

## CD: Text reordering

Divide a paragraph from the book into separate sections. Students try to work out the correct order of the text, by looking at linkers and references in the text. Now play the CD extract. Students listen and check their answers.

## DVD: What's next?

Select an appropriate clip from the DVD, for example the beginning of the film when Dorothy's car has broken down on the highway. Play the clip and then pause it at key moments in the action, e.g. as the police car comes into view. Ask students to describe who the characters are and what is happening. They then predict what is going to happen next.

## ANSWER KEY

## Self-Study Activities Pages 60–3

- 1 a) slave b) astronaut c) soldier d) engineer e) preacher
- 2 a) equal b) military c) powerful d) integrated
- 3 a) victory b) physics c) degree d) missions e) control f) bombs g) calculations
- 4 *Possible answer:* The word 'figure' means a person and a number. It's used here as a play on words, because the book is about mathematicians – people who work with numbers. The people were 'hidden' because they did important work in the background to get humans into space. Many people had never heard of these women before this book was written.
- 5 a) Because she didn't earn enough from her teaching job to feed her family.  
b) In 1941 President Eisenhower said that all jobs were open to everyone, black or white.  
c) Before the war, Hampton Roads was a farming and fishing community. During the war it turned into a powerful military capital.  
d) Because black people were not free in their own country.  
e) Because she kept taking the sign from the cafeteria, and integration was against the law in Virginia.  
f) to test new plane designs.
- 6 *Possible answers:* a) The earth's atmosphere is a mixture of gases – 78% nitrogen and 21% oxygen, with small amounts of argon and carbon dioxide. b) Because gravity is stronger on earth than on the moon.
- 7 Open answers.
- 8 a) False. Money was tight. b) True. c) True  
d) False. The MIG-15 was faster. e) False. She started her engineering course there in 1956, but it was difficult for her to get a place. f) True. g) False. She left because she was expecting a child. h) False. They realised in the first two weeks.
- 9 Open answers.
- 10 a) sending it into space b) make sure information gets to everyone on the ship and contact people on other ships  
c) Satellites have many purposes, from spying to communicating to checking the weather. d) twice
- 11 Open answers.
- 12 a) They were a group of nine black school-age teenagers, and they were trying to go to an all-white school.  
b) Sputnik 1, the world's first spacecraft and satellite, launched by the Soviet Union in October 1957 c) Laika the dog  
d) the friction of earth's thick atmosphere  
e) The United States's first manned space programme.  
f) the seven astronauts chosen to be part of Project Mercury  
j) Yuri Gagarin
- 13 a) Dorothy told Henry Pearson *that he must pay Katherine more money.*  
b) Dorothy *thought the IBM computers were the future.*  
c) Katherine *was not invited* to join the space meetings – she asked to go.  
d) Dorothy *stayed at NASA* when the West Area Computers Unit closed.  
e) Dorothy *trained again, to learn* how to use the new computers.
- 14 & 15 Open answers.
- 16 The correct order is: i, b, a, g, e, f, c, d and h.
- 17 Open answers.