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Stephen Hawking

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Stephen Hawking

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Read each chapter once without stopping, and don't worry about every word. Then read it again slowly and underline the language you want to keep. Use the **Ask the teacher** page at the end for your notes, doubts and favourite lines, and bring them to your next Apex class.

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CHAPTER 1

CHAPTER ONE

Scientist and Thinker

It is April 2015, and hundreds of people - young and old - are sitting in the famous Sydney Opera House in Australia. Great singers often come to the Opera House, but the people here tonight have not come to listen to music. They have paid a lot of money for tickets to hear a talk by a scientist - and there is not an empty seat in the room.

Everyone is excited when they see the world-famous scientist who is going to speak. It is Stephen Hawking, but he is not really here. There is a hologram of him in the Opera House - a special picture of him that looks real! Stephen Hawking himself is thousands of kilometres away in Cambridge, England. He sits in his wheelchair. His body is still because he can only move his eyes and face, and he can only speak through a computer.

'Hello, can you hear me?' he asks the crowd.

'Yes!' they shout excitedly.

Stephen Hawking is one of the greatest thinkers of our time. That evening in Sydney, he talks about his life and his ideas, and he also tells funny stories. At the end, when people leave the Opera House, they talk about their wonderful evening. They have laughed with Stephen Hawking, and they have also thought about some very big questions. Why are we here? Where did the universe come from? Does time have a beginning and an end? Stephen

Hawking always tries to answer these questions, not just for scientists, but for ordinary listeners, too. Because he tries to explain things for people, and because of his great life story, he has become a star.

Stephen Hawking has had to use a wheelchair for most of his life - and today, he cannot move, eat, or speak without help. So how does he live and work from day to day? When did he become famous? And what are his most important ideas?

CHAPTER 2

CHAPTER TWO

Stephen William Hawking was born in Oxford, England, on 8thJanuary 1942. On that same day, some people were remembering the death three hundred years earlier of another great man who studied the night sky, Galileo Galilei.

Stephen was the oldest of four children - he had two sisters and a much younger brother. His father Frank was a doctor and scientist who studied diseases. Stephen's father and his mother Isobel both had degrees from Oxford University, one of the best universities in the world. They were a very clever family, and the Hawkings often all sat and read books at the table while they were eating dinner. The family home during Stephen's earliest years was in Highgate, north London - Stephen was only born in Oxford because Britain was at war with Germany at that time, and people thought that London was too dangerous for babies.

A few years after the war, when Stephen was eight years old, the family moved to St Albans, a small town about 30 kilometres north of London. The Hawkings' house in St Albans was big, old, and very cold in winter, but Stephen loved it. He and his sister Mary liked to find lots of different ways into their house. They often climbed up the outside and then went in through open windows. Stephen was a good climber, and he sometimes climbed trees, too.

His mother Isobel often took her children out into the garden at night. On warm summer evenings, they lay on

their backs and looked up at the night sky. Even then, Stephen was very interested in the stars. He also liked to ride bicycles, dance, and play tennis.

Stephen liked to understand how things worked, and he often built little aeroplanes and boats. Nobody had computers at home or school in those days, but when Stephen was sixteen, he and some school friends built a computer from pieces of old machines. It was not very good, but they could use it to do mathematics problems.

Stephen did not like school very much, but he had some good friends there. They enjoyed talking together about things like science and music. Stephen's friends called him 'Einstein' because he was so clever. His teachers knew that he was clever, too, but he was always laughing and making jokes at school, and he did not work very hard. He was not a good student!

Stephen began to work harder in his last year at school because he wanted to study science at Oxford University. He became a student there, at University College, when he was only seventeen years old.

He studied physics for his degree. Physics is very difficult to understand for most people, but it was easy for Stephen, so he did not have to work as hard as many other students. And Stephen did not need to write a lot of notes, because he could remember things very easily.

Stephen was younger than many of the other Oxford students, and he felt lonely at first, but that changed when he discovered rowing. Stephen was the cox: he did not

row, but he sat at the front of the boat and told the rowers to go faster or slower, left or right. Stephen wanted his rowing team to go faster than the other teams, so he often did dangerous things to go past their boats. He sometimes took his team's boat very near to other boats, and even hit them!

After a difficult start, Stephen had a great time at Oxford. He had many friends in the rowing team, and he liked to listen to music with them and go to dances. Stephen often stayed out with his friends late at night, and had to climb over the walls to go back to his room because his college closed its doors at midnight.

Stephen left Oxford University in 1962 with a very good degree, so he decided to go to Cambridge University and study for a PhD. A PhD is a higher university degree, and anyone who wants to become an important scientist or teach at a university needs to get one.

The summer before he went to Cambridge, Stephen travelled across Europe with a friend, in trains and buses, and then went on to Iran. It was a wonderful journey, and for the first time, Stephen was far away from his family. He could go anywhere and do anything. He was a happy young man and he had a great life in front of him. But a few months later, everything changed.

CHAPTER 3

CHAPTER THREE

One day in Stephen's last year at Oxford University, he was walking down some stairs at his college when he suddenly fell. Friends helped him, but for a few minutes, Stephen could not remember who he was or anything about his life. The accident worried Stephen, but his doctor did not think that there was anything wrong with him. Nobody knew that he was really very ill.

Stephen started at Cambridge University in October 1962. He knew that he did not feel right, and his arms and legs were not as strong as before. But he tried to forget about these problems and enjoy life. For his PhD, Stephen was studying cosmology: how the universe works. Cambridge was a good place for studying physics because it was home to many great scientists. It was a good place in other ways, too, because there were lots of young people, music, and parties.

Stephen went home to St Albans for the winter holidays in December 1962. There he saw his family and his old school friends, and he went to a New Year party. At the party, Stephen met a girl called Jane Wilde, and they soon became good friends.

Stephen was happy, and he looked well, too, but one day that winter, Stephen was outside with his mother when he fell, and could not get up. His mother took him to the doctor, and just after his birthday in January 1963, Stephen went into hospital. The doctors kept him in

hospital for two weeks, and at last, they explained what was wrong: Stephen had a disease called ALS. He was only twenty-one, and the doctors thought that he would only live for two more years.

Not many people get ALS, but it is a terrible disease. If you have ALS, it slowly becomes harder and harder to move your body. First, it becomes difficult to move your arms and legs, and then, after a time, you cannot eat, speak, or move your head. Usually, in the end, people with ALS die because they cannot breathe any more. When Stephen's mother asked a doctor, 'What can we do to fight the disease?', the answer was 'Nothing'.

This was a terrible time for Stephen, but he tried to be strong. One night, he had a strange dream. In the dream, some people wanted to kill him, and while he waited for death, Stephen thought about his life. Then he knew that he wanted to do lots of things. The dream helped Stephen. He knew now that he must not just feel sorry for himself. Perhaps he did not have a lot of time, but in that time, he needed to try and live an ordinary life. So, after some time at home, Stephen went back to Cambridge and began to study for his PhD again.

That June, Stephen took his friend Jane Wilde to a big summer party in his college, Trinity Hall. Music played and lights burned in the gardens of the beautiful five-hundred-year-old college. People laughed, ate, and talked. Stephen could not move very well by then because his legs were not very strong any more. But Stephen and Jane listened to music, and they tried to dance. Stephen

had blue-grey eyes and a big smile, and Jane liked being with him. Stephen liked Jane very much, too. She was clever, funny, and beautiful. For a few hours that evening, Stephen could try to forget about his troubles and enjoy life.

After that summer party, Stephen and Jane often met in London, because Jane was studying French and Spanish at university there. Jane knew that Stephen was very ill, but she loved him, and they decided to marry. This changed Stephen's life, and gave him hope for the future.

Jane and Stephen got married in July 1965. They did not have very much money, but they were happy together. Stephen now needed a stick to walk, and he could not easily hold a pen and write any more. But after two and a half years with ALS, he was still alive and doing well. Everything felt possible, and Stephen and Jane never talked about his disease - they both wanted to think about life, not death.

They went to America that summer. Stephen went to physics lectures at Cornell University, and he and Jane also visited many great places in New York. Did anyone see them when they stood at the top of the Empire State Building one day and looked down at the streets of Manhattan? When Stephen became a famous scientist, years later, everybody knew his name, but nobody knew him then. He was just another British visitor to New York: a young man standing next to his wife, on top of the world.

CHAPTER 4

CHAPTER FOUR

In 1964, the year before he got married, Stephen went to an important lecture in London by a British scientist called Fred Hoyle. At that time, Hoyle was one of the greatest scientists in Britain, and the room was full of famous and important people. Everyone listened carefully while Hoyle explained his latest theory in cosmology. But when it was time for questions, Stephen stood up and said that Hoyle was wrong.

Everybody looked at Stephen. He was only a young PhD student, and nobody knew who he was. But Stephen said that there was a mistake in the mathematics of Hoyle's theory. He said that it did not work. Of course, nobody in the room that day agreed with Stephen. But a few months after Hoyle's lecture, scientists found other problems with Hoyle's theory. Hoyle really was wrong.

Hoyle's theory of cosmology said that our universe has always been the same. But Stephen and some other cosmologists thought that the universe began suddenly a long time ago. The universe was very small at first, they said, but in seconds, it became much, much bigger - and it is still getting bigger today. People called this theory 'the Big Bang'. Today, cosmologists think that this is true, and they think that the Big Bang happened about 13.8 billion years ago. The Big Bang was one of the most important ideas in cosmology, and when Stephen was working on it, he was still only in his twenties.

Einstein and space-time

To understand Stephen's ideas, we first have to look at the theories of another great thinker - Albert Einstein. In 1905, Einstein had an important theory about space (the empty place between things) and time. Space is all around us: we can start in one place, walk around in space, and then go back to our starting place. But we cannot move around freely in time. Space and time feel different, but Einstein said that they are really two sides of the same thing - like two sides of a piece of paper. We call this 'space-time'.

Einstein also explained gravity. Gravity happens because things like stars 'push into' space-time and bend it. This is difficult to understand, but physics teachers explain the idea to their students like this: they take a big sheet of something which stretches (gets longer when you pull it). Then they ask two students to hold the sheet between them, and they put a heavy ball on it. The ball bends the sheet, just like a star bends space-time. When the teacher puts a lighter ball on the sheet, it moves closer to the big ball because the big ball is heavier and bends the sheet more. In the same way, because of gravity, lighter things always move closer to heavier things. For example, a small planet will always move closer to a big one.

In Stephen's first years at Cambridge University, he used Einstein's theories to study one of the strangest things in the universe: black holes. When a star stops shining, gravity pulls everything in the dead star closer and closer together, and the star becomes smaller and smaller.

In the end, gravity pulls everything into one very, very small place in space. Because everything from the dead star is in one place, this bends space-time more and more, and at last, a hole is made. The gravity in this hole is very, very strong, so nothing can escape from it - not even light - and it becomes a 'black hole'. When things like other stars come too close to a black hole, they cannot escape its gravity. They fall into the black hole.

In the early 1960s, the scientist Roger Penrose discovered something new about black holes. He said that the centre of a black hole becomes smaller and smaller, and at last there is no space there. And because space and time are two sides of the same thing, time stops inside a black hole, too!

This gave Stephen his first great idea. In his PhD, he wrote about the universe at the time of the Big Bang. Stephen said that it was just like the centre of a black hole. Everything that later became the stars and planets was in one place: a place with no space and no time. Stephen says that you cannot ask 'Where did the Big Bang happen?' or 'What happened "before" the Big Bang?' These are questions about space and time - and there was no space or time before the Big Bang.

CHAPTER 5

CHAPTER FIVE

After Stephen finished his PhD in March 1966, he went on working at Gonville and Caius College, Cambridge. Stephen's work in cosmology built on the theories of Roger Penrose, and in the 1960s and 1970s, Stephen studied black holes with him and others. Together, they discovered a lot of important things about the universe - for example, how black holes begin and what happens inside them. They also asked questions about what happens when two black holes meet.

Hawking and Penrose won a lot of prizes for their work, too, like the Gravity Foundation Prize and the Adams Prize. Stephen became the world's number one black hole scientist. His work was very important, because when cosmologists know about black holes, they can understand many other things about the universe, for example, how it began and what will happen to it in the end.

Stephen was teaching at Cambridge University at this time, but in 1974, there was a big change for him. An important university in California called California Institute of Technology (Caltech) asked Stephen to teach there for a year - so the family went to live in the USA. Stephen and Jane made lots of friends there. Their house was very close to the university, and it was always full of scientists and other friends at the weekends. They had parties and dinners, and Stephen often sat with his friends and talked about science late into the night.

At Caltech, Stephen worked with some of the greatest names in physics and cosmology. In 1974, Stephen gave an important lecture, and he explained something very surprising. Nothing escapes from inside a black hole, he said, but radiation comes from a place around the black hole. Because radiation is escaping from around the black hole, the black hole slowly becomes smaller and smaller - and after a long time, there is no black hole any more. Many cosmologists just laughed at this idea when Stephen first explained it, but most people today think that it is true.

Soon after this, while Stephen was still in California, he had some important news. A letter arrived which asked him to be one of the scientists in London's world-famous Royal Society. This was a great and exciting thing for a thirty-two-year-old scientist.

The Hawkings went back to Britain in 1975, and Stephen started work at Cambridge University again. He was doing very important work in cosmology at this time, and by the end of the 1970s, physicists everywhere knew about him. He was also getting prizes and special degrees from universities and societies around the world.

Then, in 1979, Stephen became Cambridge University's Lucasian Professor of Mathematics. This job is for the very best mathematicians and physicists, and some of the greatest names in science have been Lucasian Professor in the past. One Lucasian Professor was Isaac Newton, the father of modern physics and the man who discovered gravity in the late 1600s. Now Stephen was one of these

great people, too.

Stephen's work brought together many different ideas in physics for the first time, and this started him on a new journey. He wanted to find a 'theory of everything' - one theory that we can use to understand any question in physics, like 'How did the universe begin?' and 'What is everything really made of?' No one has found a theory of everything yet, but many scientists are working on the problem. One day, perhaps, if they find this theory, we can use it to build wonderful new machines, or even travel to the stars! It only became possible for people to visit the moon because of past theories in physics - that is how important these theories are.

Some of Stephen's theories about the universe have changed a lot, and sometimes Stephen has been wrong about things, too. But this is not unusual in science - even the great Albert Einstein made some mistakes. Stephen is not afraid to ask big questions, for example, 'Will people travel in time one day?', 'Can scientists make small black holes here on Earth?', and 'Are there other universes?' We do not know the answers to these questions, but thanks to Stephen, we are beginning to understand how to study them.

CHAPTER 6

CHAPTER SIX

In 1963, doctors said that Stephen would only live for about two more years. But fifteen years later, he was still alive. His disabilities became a little worse every year, and he had many problems, but he did not stop working - and he never lost hope.

After 1969, Stephen had to use a wheelchair. He could not use his hands very much by then, so Jane had to write the words for Stephen's lectures for him - and she also had to look after him. By the late 1970s, Stephen could not use a lot of his body. His arms were not strong any more, and he could not speak easily. Only Stephen's family and close friends could understand his voice, so when he gave a lecture, a scientist friend or a student always helped him. He spoke quietly to them, and then they said his words to everyone in the room.

By this time, Stephen could not write notes, so he had to remember everything. He was already good at this, but now he had to be really good. He found special ways to remember things, and he learned to read something once or listen to a lecture once, and then keep it all in his head.

Physicists write lots of difficult mathematics when they think about problems, but Stephen could not write, so he had to work in a different way. When Stephen thinks about a problem in physics, he usually uses pictures in his head, and not mathematics, to find the answers. And because Stephen thinks about things in a different way, he has

different and new ideas. He does not have to look at lots of books or sit at a desk when he is working. He carries all his ideas about a new theory in his head, so he can think about it at any time. Once, he discovered something important about black holes when he was getting into bed!

In 1985, Stephen was meeting with other scientists in Switzerland when he became very ill. He could not breathe without a machine, and the doctors thought that he would die. They wanted to turn off the machine, but Stephen's wife Jane stopped them doing this. For weeks, Stephen was very near to death. Friends and family stayed by his bed - they talked to him, read books to him, and hoped for him. And he lived.

When Stephen was a little stronger, doctors in England opened a hole in his throat. Now he could breathe through the hole, and without a machine. But Stephen needed the help of nurses twenty-four hours a day - and he could not speak any more.

Stephen now needed to talk to people and ask for things in a different way. At first, he used a special A-Z to 'talk'. Friends and nurses held up the letters A-Z one at a time, and Stephen moved his eyes when someone showed him the right letter. In this way, his helper could write his words. But talking like this was very difficult and slow.

Stephen wanted something better, so his friends spoke to somebody who made computers and machines for people with disabilities. After a lot of hard work, a special machine was made just for Stephen. With this machine, Stephen

had to look at lots of words on a computer, and then touch a little box in his hand for the right word. In this way, Stephen could write about fifteen words a minute.

By the end of 1985, Stephen's machine had a special 'voice': when he wrote on the computer, the 'voice' spoke slowly for him. Stephen's new computer voice sounded strange - like a robot - but it helped him a lot. Before, when he spoke, most people could not understand what he was saying. Now, suddenly, he could talk to anybody again - even a big room full of people - as loud as he wanted.

Stephen's computer has changed since then because his disease has become worse - and computers have become better. He now wears a small camera because he cannot use either of his hands any more. When he finds a word on the computer, he moves his face a little. The camera sees this and writes the word. Stephen can now only find three words in a minute, so it takes him hours to write or say anything. Writing on a voice computer is very difficult, but Stephen has written many important lectures - and seven books - like this!

Stephen's computer voice has not changed since 1985. There are lots of new and better computer voices now, but Stephen does not want a new one. His voice has become as famous as him, and when Stephen speaks, everyone knows who it is!

CHAPTER 7

CHAPTER SEVEN

By the middle of the 1970s, cosmologists everywhere knew about Stephen because of his work on black holes. Ordinary people in Britain began to hear his name more after he was on British TV in Professor Hawking's

Universe in the 1980s. Stephen also got an important British award called a CBE in 1982. After he got that award, he was often on TV and in the newspapers - first in Britain, and then around the world.

Of course, for many people, the story of Stephen's life was as interesting as his ideas about physics. He was so clever, but he had a body with terrible disabilities. He could understand the universe, but he could not move his arms or legs. And after twenty years with a deadly disease, he was still alive! Stephen Hawking's story was wonderful, but people also loved him as a person. He could explain difficult ideas in science, and when he talked about them, they became interesting. He always had a funny, clever reply for every question, too.

Explaining science on TV gave Stephen a great idea. He decided to write a book about cosmology for ordinary people, not scientists. Many people said that it was not possible. They did not think that anyone would want to read a book like that. But Stephen did not listen.

When Stephen began to work on his book, A Brief History of Time, in 1982, he spoke the words to someone who wrote them for him. But after he lost his voice in 1985, he

had to finish the book on his voice computer, writing very, very slowly. Stephen also needed to change some pages of the book again and again - because he wanted ordinary people to understand it easily. At last, in 1988, after a lot of very hard work, the book was ready. And when it began selling in the shops later that year, people loved it.

More than ten million people bought A Brief History of Time, and you can now read it in forty different languages. Stephen travelled a lot to talk about the book, and in many towns around the world, people waited for hours to see him. Stephen still gets letters and emails about A Brief History of Time today. Readers write to him and say how much they enjoyed it.

So why did people like A Brief History of Time so much? Perhaps because it asked many important questions, and because people who read it understood for the first time how wonderful our universe really is. Many young people became interested in science - and perhaps became scientists - because of Stephen's book.

Since A Brief History of Time, Stephen has written more science books for ordinary readers, and a book about his life, called My Brief History.

Stephen wants children to understand science and cosmology, too, so he has written some books for children with his daughter, the writer Lucy Hawking. In the books, a young boy called George travels around the universe with his friends. He visits places like black holes and does some wonderful things. The books are great stories, but

they are also science books. They explain physics and cosmology in an easy way for children.

Stephen Hawking's theories, books, and life story have made him one of the most famous people on Earth. People from newspapers and the TV are always asking to talk to him, and his office in Cambridge is often full of cameras. People do not just want to know what Stephen thinks about cosmology. They ask him for his ideas about anything - from computers to football and pop music. Stephen likes to make jokes, too, and he has been on TV in The Simpsons and The Big Bang Theory. There are also two great films about his life.

It is not always easy to be famous. But because everyone knows Stephen's name, he can do many things that are important to him - speaking against wars and helping children with disabilities, for example.

Since the 1960s, Stephen and Jane have worked hard to help people with ALS. Jane has visited people with the disease in their homes, and Stephen and Jane have done many things to get money for ALS charities. Being famous has helped their work. Before Stephen became ill, not many people knew about ALS, but now, a lot of people have heard about it. Today, ALS charities are working to try to stop this terrible disease, and people have given millions of pounds to help them.

In the 1980s and 1990s, Stephen travelled all over the world to give lectures and meet with scientists. When he travelled, he also often met with groups of children who

had disabilities. He answered their questions, told them stories from his life, and gave them hope. Since 1990, he has worked with a charity called SOS Children's Villages, too. The charity helps children who have no mothers and fathers, and tries to give them a better future.

On 29th August 2012, Stephen spoke at the opening of the London Paralympic Games. More than sixty-two thousand people were there that night, and millions more were watching on TV around the world. At the opening, Stephen talked about how nobody is ordinary - everyone is different. And he said that everyone can be good at something - even people who have very difficult lives. Stephen has shown this, and there are not many people in the world, with or without disabilities, who have become as important or as famous as him.

CHAPTER 8

CHAPTER EIGHT

In December 2014, Stephen and Jane Hawking went to London for the first night of a new film about their lives, The Theory of Everything. The film was made from a book by Jane. Felicity Jones played Jane, and Eddie Redmayne played Stephen - and he won an Oscar and many other awards for it.

Stephen and Jane smiled for photos with the stars of the film, and they looked very happy when they went down the red carpet and into the cinema. But life has never been easy for them, and The Theory of Everything showed people that.

When Jane married Stephen, she knew that he had ALS. They both thought that Stephen would not live very long, but they wanted to be together and have a family. In 1967, Stephen and Jane's first child, Robert, was born, and a few years later, they had a daughter called Lucy. Stephen could not do many ordinary things with the children - he could not take them to school or play with them in the garden. But he tried to be a good father, and he loved being with his children.

Stephen and Jane's third child, Tim, was born in 1979. He was much younger than the other Hawking children and, by this time, Stephen was already using a wheelchair and he could not speak very much. For the first years of Tim's life, he could not really understand his father's voice. He and his father could only have a real conversation after

Stephen got his voice computer. But Tim and Stephen spent a lot of time together. Like his father, Tim enjoyed making jokes - and he liked driving his father's wheelchair around the house!

At that time, it was not easy to live in a place like Cambridge if you had to use a wheelchair. When Jane and Stephen went out, they had problems with holes in the roads, places that had no space for a wheelchair, and buildings with lots of stairs. They often had to ask for help when they wanted to go into a shop or just cross the street. So they decided to fight for the needs of people with disabilities, and they wrote letters to newspapers and to important people.

They also went out in the streets with other people who had disabilities, and their families, and called for change. All around Britain, groups of people with disabilities talked about how difficult life was for them. And slowly, more people began to listen to their needs. Roads and buildings all around Britain began to change, and at last, people with disabilities could use them more easily.

Stephen needed a lot of help all day and night, and he often had to go into hospital. For many years, Jane was studying for a PhD, but she also had to look after the children, wash and dress Stephen, tidy the house, cook, and give Stephen his food one piece at a time. And when it was time for bed, Jane and another helper had to carry Stephen up the stairs.

When Stephen, Jane, and the children were in America in 1974, a PhD student lived with the family and helped at home. Stephen and Jane thought that this was a good idea - so back in Britain, for many years, different PhD students lived with them in their house in Cambridge, and looked after Stephen with Jane. Nurses and other people visited them all the time, too, so the house was always full of people. It was not easy for the Hawkings to be alone, and they could not have an ordinary family life.

Stephen and Jane's marriage came to an end in 1990. In 1995, Stephen married his nurse, Elaine Mason, and they were together for eleven years. He now lives alone, but people visit his house and look after him twenty-four hours a day. Jane married again in 1997, but she is still good friends with Stephen. They often meet and see their children together, and they have grandchildren now, too.

Lucy and Tim Hawking went with their mother and father to the first night of the film The Theory of Everything. They watched when Eddie Redmayne danced with Felicity Jones - the woman in the film who played their mother. They watched when a young 'Stephen Hawking' rode a bicycle, went out in a boat, and enjoyed himself with friends. And when Tim sat there in the dark cinema, he cried a little - because he never saw his father do those things in real life.

CHAPTER 9

CHAPTER NINE

In February 2016, some cosmologists discovered what happens when two black holes meet. Stephen was not one of these scientists, but people wanted to know what he thought about the news. 'What does it mean?' they asked. 'How important is this?' Stephen explained the cosmologists' work, and why it was important, in a way that ordinary people could understand. People around the world are always interested in Stephen's ideas. We listen to Stephen Hawking because he is one of the greatest thinkers of our time.

Stephen has never stopped asking questions and trying to understand our wonderful universe. When he began his work on black holes, many people asked, 'Are black holes real or not?' But today, scientists think that there are black holes everywhere in space. There is even a black hole in the centre of our galaxy, and it is bigger than a million suns! Are Stephen's other theories right, too? We still do not know, and we will not know for many years. But one thing is sure: Stephen Hawking's ideas have explained many important things in physics and cosmology.

Cosmologists like Stephen know that we live on an ordinary planet near an ordinary star in an ordinary galaxy. They say that our galaxy is one of billions out there in space. Perhaps life is 'ordinary', too, but Stephen thinks that people are not ordinary, because we have science. Because of science, we have learned how to look at the

world around us and ask questions. We have begun to understand what the universe is, how it began, and why we are here. And because of this, Stephen thinks that we are very special.

Science has changed the lives of everyone on Earth, and Stephen thinks that it is very important for our future. But science can also bring dangers, he says. We are building robots that are better and better all the time, and Stephen thinks that perhaps one day, somebody will use robot soldiers which can kill millions of people in a war. Scientists are also trying to make computers which can think. But when we build them, will these computers become cleverer than us? We must be careful and learn how to use these computers, Stephen thinks - before they learn how to use us!

But Stephen has a lot of hope for the future, too. He thinks that one day, people will build wonderful new machines and travel through the galaxy. They will discover new worlds, and will perhaps decide to live far away from Earth.

Stephen wants to go into space himself one day, and he already has a ticket! He wants to be one of the first passengers on a special new 'space plane', which will take ordinary people into space for a short time, and then bring them back again. It will be a dangerous journey, but Stephen wants to go because he wants more people to be interested in space travel.

In 2007, Stephen flew in another special plane, from the Kennedy Space Center in the USA. The plane climbed high into the sky above Florida, then suddenly came down very fast. The people inside were falling to Earth, but the plane was flying down just as fast - so the passengers felt no gravity for about twenty-five seconds. Stephen loved the feeling of 'zero gravity'. He smiled from ear to ear while his helpers turned his body around and around. The great scientist and thinker was flying!

Ask the teacher

Notes, doubts and favourite lines to take to your next class: