



Lucy Hawking

Resource created by Linda Murray

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About Lucy Hawking

Lucy Hawking was raised and educated in Cambridge. She studied French and Russian at Oxford University before becoming a journalist writing for British newspapers and New York magazine in the US. She has appeared on both television and radio. She has written two adult novels. Her focus now is to write children's novels where adventure and science combine to create exciting, fast-paced stories appealing to a younger audience.

She has now written four books in the adventure series, each exploring aspects of astronomy and cosmology. She aims to bring science to a wider, younger audience, saying, "We need to get away from this idea that science is... plodding... a linear activity that doesn't involve creativity... imagination." In the novels, George and his friends embark on exciting, dangerous adventures, all of which are based on real scientific data. Lucy has said that, "In science, imagination without information is just fantasy," and her novels reflect this principle, offering complex theories in a fun and accessible format.

Translated into 38 different languages the books have each met with rave reviews. Lucy was the recipient of the Sapio Prize for Popularizing Science in 2008. She holds talks and discussions across the globe engaging children in science and education.

Lucy lives in Cambridge with her son William who has autistic spectrum disorder. She is involved in a number of charitable organisations: she is a friend of the Autism Research Centre in Cambridge and is vice-president of the Star Foundation. She has also worked closely with those involved in helping young people whose parents have developed Motor Neurone Disease.

Her father Professor Steven Hawking is the co-author of the novels, writing or editing the scientific portions. He is widely regarded as one of the most influential theoretical physicists of our time.



The official Lucy Hawking website: www.lucyhawking.com



The Authors Live event with Lucy Hawking

www.scottishbooktrust.com/authorslive



Garry Parsons – illustrator: www.garryparsons.co.uk

About these resources

These resources are full of cross-curricular activity suggestions to help you explore Lucy Hawking's books with your pupils in library and classroom activities. Adapt and use as you see fit!

The resources have been produced to help you get the most out of our online Authors Live event with Lucy, but you can use them at any point to engage pupils with her books.

 You can watch Lucy's event on 22 May 2014 – here is the link to register for free: www.scottishbooktrust.com/learning/teachers-librarians/authors-live/authors-live-events/lucy-hawking .

 If you don't watch the event on the day, you will be able to view or download it afterwards from our Watch on Demand section:
www.scottishbooktrust.com/learning/teachers-librarians/authors-live/watch-on-demand

Useful websites

Websites offering a wealth of space-related activities and support include:

NASA

 A great website for images and other information:
<http://spaceplace.nasa.gov/>

NASA STARCHILD

 This site has put space terminology into child-friendly language and has interactive activities and tasks creating a very accessible resource:
<http://starchild.gsfc.nasa.gov/docs/StarChild/StarChild.html>

NATIONAL SCHOOLS OBSERVATORY

 This website is a fantastic resource. There is a teacher zone and a student zone where there are plenty of activities and suggestions. The National Schools' Observatory (NSO) allows schools to make free use of a professional robotic telescope designed for scientific research. The telescope is located on the island of La Palma in the Canary Islands, and is known as the Liverpool Telescope(cited from NSO website).
www.schoolsobservatory.org.uk

INTERNATIONAL SPACE AGENCY

Not all the links appear to be up to date, but it does help us to appreciate the international flavour of space exploration:

 www.isa-hq.com/

SCIENCE AND TECHNOLOGY FACILITIES COUNCIL

Much of the storyline of the third book in the series *George and the Big Bang* revolves around the work of the Large Hadron Collider. This website has a wide range of teaching resources including free publications for schools. These can be ordered online e.g. posters and booklets. There is a cartoon booklet on the big bang which is age appropriate for second level:

 www.stfc.ac.uk/1801.aspx

STARGAZING ACTIVITY PACK

 This pack is full of fantastic ideas and activities; many would work well as home learning tasks: http://downloads.bbc.co.uk/tv/guides/bbc_stargazing_live_activity_pack.pdf

 Check out this blog on our website about exploring writing through science: www.scottishbooktrust.com/blog/teachers-librarians/2013/11/exploring-writing-through-science

Note to teachers using this resource

It is assumed that when completing any of the suggested activities teachers and learners will have considered facts relevant to the task, e.g., if you are writing a brochure for moving to a planet, facts will have been researched, or taken from the novels, to help create an imaginative, yet informative piece of work as opposed to pure fantasy (see Lucy Hawking's quote in the earlier section regarding the link between imagination and science).

George's Secret Key to the Universe

CfE

George is 10 years old and lives with his parents and his pet pig Freddy. His parents are ardent eco-warriors and refuse to embrace technology and science as they believe these are harmful to their existence and to the survival of planet earth. They are a constant source of embarrassment to George who suffers valiantly through his father's protest marches and his mother's broccoli muffins. His greatest desire is to own a computer, but he knows this is never going to happen.

One day he discovers his pig is missing from his pen and to his horror George realises Freddy has escaped through the fence into Next Door. George has been forbidden by his father from going into Next Door and has abided by this edict. He has never seen anyone there. In order to rescue Freddy he must disobey his father and crawl through the fence. Following Freddy's trail to the house itself George is confronted by a girl called Annie. From this moment on, George's life is changed. Annie and her parents have just moved into the house. Eric, Annie's dad, is a scientist. He loves to share his knowledge and encourages George to become interested in it, helping him to see that his parents aren't entirely right that all science is bad news.

George is introduced to Cosmos: a super computer with incredible powers who talks and responds in an almost human fashion. Cosmos is able to create windows into space and opens up a whole new world for George. The computer can also transport people to different areas in the galaxy and helps Eric in his search to find a suitable replacement planet for use when we have damaged earth beyond repair. George is asked to keep Cosmos a secret. Unfortunately George blurts out the news of Cosmos to his teacher Dr. Reeper who begins to behave in a very odd and creepy way, roping in the school bully and his friends to help in his dastardly plans. In the meantime George and Annie embark on a series of exciting adventures across the universe and George experiences first hand all that he has learned from Eric.

The climax to the story involves George and Annie embarking on a rescue mission to save Cosmos and Eric – Can they recover Eric from the Black Hole? Will Cosmos ever be the same again?

LANGUAGE

- Cosmos is able to produce a window to the universe in Eric and Annie's living room. If you could have Cosmos create this for you, what would you want the window to show? What would you be able to see? Write a report on your 'observations'. The website Amazing Space has a number of videos which would help get you started as they show images of various galaxies; you can find them in the 'For Educators and Developers' section. You can choose from a range of

LIT 2-20a

videos; either the full package which takes 13 minutes, or select those which you feel are relevant to the task and your learners. The videos look similar to the window Cosmos can create which will give your learners a better 'picture' in their head of the descriptions found in the novel.

As an alternative to writing a report, you could produce a wall or window display or a 3D model.

<http://amazing-space.stsci.edu/>

 alternatively...

- Cosmos creates a door into space depending on whether he has the co-ordinates – where would you ask Cosmos to take you? Write your own space travel journal with accompanying diagrams and facts for the place you are taken to. If possible, read some of the descriptions in the novels first and research some of the facts before beginning your journal.
- Black Holes – Eric falls into one and once rescued doesn't seem to know what happened to him. What if he later remembers every detail? Write Eric's account of his time in the Black Hole. Alternatively, write your own adventure into the unknown!
- Look into star constellations and their myths and legends. Create your own constellation and write the accompanying myth. Think about how you might display both your constellation and its tale. Plan a story-telling session by candlelight having made constellation star jars for the tea lights (ideas taken from Scholastic Project Box where there is a whole project on this called Star Myths). Share your session with another class

Find out how to make a star jar here:

www.craftswithjars.com/2014/01/diy-constellation-jar.html

 alternatively...

- Create the stories of Saturn's moons – use folklore or star mythology to help focus your ideas. Research the names they have been given and find out what you can about their geography to help you think about the tales. Use the photographs in the book as a starting point.

ART AND LANGUAGE

Select one of the many stunning photos from the book and use this to develop your descriptive language – take it further and develop this in art by considering how to recreate the ‘look’ perhaps developing tints and tones work. Try out a range of media to create a quartered display with four different interpretations of the same image e.g. use chalks, gouache, oil pastels and watercolours

ART AND DESIGN

- Make a paperweight based on a particular planet. Study the geography of the planet to ensure you have all the craters, mountains etc. planned out on paper before using one of a range of model-making media. Clay would allow for a detailed study of all the features. Alternatively, using an inflated balloon or scrunched newspaper, Modroc (plaster impregnated bandage) or papier maché would offer different challenges.

Make a display, including some information for other pupils alongside your planet. You could even display this information in the style of the opening text in Star Wars, where the words get larger towards the bottom of the screen! Review each others’ work, and improve your display based on what others say.

- To teach the skills of shading and texture, try this planet and galaxy art project from the Deep Space Sparkle art lesson website. The lesson is called Spheres in Space.



www.deepspaceparkle.com/2009/03/26/planets-and-galaxy-project-for-fifth/

MATHS

- In the Student Zone of The National Schools Observatory (NSO) website there are activities to help you calculate your weight and age on different planets! Whilst there is a ready reckoner available, the NSO also provides you with sufficient data to be able to calculate these for yourself. There is lots of scope here for data handling



www.schoolsobservatory.org.uk/students

- Co-ordinates: Eric travels through space logging co-ordinates to help map out the universe and beyond. Develop some co-ordinate work either directly related to space or perhaps to map out an image or journey. This website has some interactive space-themed co-ordinate activities



www.mathplayground.com/spaceboyrescue.html

CfE

ENG 2-27a
EXA 2-02a

EXA 2-04a
HWB 2-11a

EXA 2-03a

MNU 2-20a

MTH 2-18a

SCIENCE AND TECHNOLOGY THROUGH LANGUAGE

Create factfiles by reading through the 'science bits' of the novels. Develop (Name of your school) School Science Centre noticeboards to display the information to target a specific audience e.g. the younger pupils in the school. This might be tackled as a context for learning how to develop Powerpoint presentations or a science game or note-taking skills.

alternatively...

Make a set of Top Trumps to play with pupils from another stage either as a transition exercise or promoting vertical learning by involving younger age groups. Give your pupils free reign to make up the categories. For less confident pupils you could suggest some categories to begin, such as number of moons, temperature, size, etc.

HOME LEARNING ACTIVITIES

Set your learners a stargazing task. Use the starcharts from the BBC website to help identify the constellations and have your learners record their sightings.



http://downloads.bbc.co.uk/tv/stargazinglive/sgl_standalone_starcharts2014.pdf

CfE

LIT 2-25a
TCH 2-09a

LIT 2-26a

SOC 2-14a

George's Cosmic Treasure Hunt

Having won a computer in a science competition in school, George is now deeply involved in studying all he can about science and in particular anything to do with the planets and the universe. He has managed to help his parents appreciate that science is not all about ruining the planet and can be used to help their cause.

George is devastated when Eric announces that he has accepted a post in California with the Global Space Agency to look for signs of life in the solar system, beginning with a project on Mars. Before they leave for the States, Eric gifts George a book *The User's Guide to the Universe* which has papers written by all the members of the Order of Science and is referred to regularly throughout the story.

Eric finds life without Annie and Eric very dull but perks up when Annie sends him a desperate SOS demanding his immediate arrival in the US to help her with a space secret code. With his Gran's help, he persuades his parents to allow him to go, they take advantage of this too and head off on an eco-mission to the South Pacific.

On arrival in the States, George and Annie's friendship falls straight back into place. Annie explains that Cosmos has been trying to send them a

message, even though he is no longer a fully functioning super computer following his time in the hands of the evil Dr Reeper. Between Annie, George and their holiday companion Emmett, a highly intelligent computer and space 'nerd', they set out to try to repair Cosmos and work out his clues.

They plan for their hunt to begin during a visit to the Global Space Agency where they have been invited to attend a shuttle launch. Unfortunately for Eric, the latest robot to Mars, Homer, is struggling to work properly and Eric becomes caught up the problems this is causing. Cosmos, now acting like a moody teenager sends them out to Mars to find out what is happening and they begin a treasure hunt like no other. They end up transported to different places beginning with Mars where Homer's odd behaviour is actually down to his attempts to give Annie and George a clue. Through continuing to follow the clues and using Cosmos' ability to transport them they find themselves in some very inhospitable places. Eventually Eric catches up with them as he is extremely worried after realising what they have been up to. All appears lost until they see a shape moving towards them. Once again they are faced with Dr Reeper and the mystery of the treasure hunt is soon revealed.

Things take a most unexpected turn and Reeper's issues with Eric are explained. Eventually with the help of a second super computer, Pooky, all arrive safely back on earth.

LANGUAGE

- Cosmos is a super computer which has been developed to help in the exploration of other galaxies. He is a chatty computer who even manages to blush when given compliments and in the second book turns into a moody teenager! To activate Cosmos' ability to produce windows and doors into space, ENTER must be pressed: if you had access to Cosmos, what would you want to see happen when you pressed ENTER? You can choose space related information, but also extend beyond this and think of what else you would like Cosmos to do. Write the appropriate page in the instruction manual to describe what will happen when ENTER is pressed.

alternatively...

- Design your own super computer. What would your computer specialise in? What would you have it do? Design the advertising campaign to go with the launch of the new compute, and again you can write an instruction manual.
- Hold your own space treasure hunt. Where would you go? Create the clues by designing a code which must be broken. Work in groups and set the challenges for the rest of your class.

LIT 2-28a

LIT 2-29a

LIT 2-24a

- Hold a debate about alien life. Split the class in half, or work with a stage partner class and agree the debate question. Spend time researching the arguments for each side before setting up a debating chamber.

SCIENCE/HEALTH AND WELL-BEING

In the novel the members of the order of Science come together for a fancy dress party at Eric's house. This is no ordinary fancy dress party though: there are no pirates or sheet-wrapped Romans. Everyone there is dressed as something to do with space science e.g. one member has come as a red shift, another as Jupiter. Hold your own space-themed party. Everyone attending should be able to 'take a minute' to explain what they are. Make a video of each person during their presentation and use this as a learning resource or as part of a class space display. You can also bring some space themed food, come up with some space music, or arrange some other form of entertainment, perhaps a space dance! You could also play space themed games: pass the planet, musical asteroids, pin the tail on the comet – there are limitless possibilities!

Here are some great ideas for costumes: www.coolest-homemade-costumes.com/space-costumes.html

SCIENCE AND TECHNOLOGIES

- Design an orrery to demonstrate how our Solar System orbits the sun, or try to make one to explain a binary star system like the one Annie and George end up on during their treasure hunt. For instructions use the BBC activity pack.



http://downloads.bbc.co.uk/tv/guides/bbc_stargazing_live_activity_pack.pdf

additionally...

- make use of a software package to create a mini film to help explain orbital movement. You could use shadow puppets for this, and objects from your orrery in the video, either in an animation or suspended by strings. Think carefully about the target audience: perhaps some of the younger stages or invite a stage partner class from another school to join in.



www.filmeducation.org/resources/primary/teaching_with_film/primary_animation/

- Set up a wikispace and use this for your learners to help them log their learning. What can you do to encourage others to view or contribute to the space?



www.wikispaces.com/content/classroom/about

CfE

LIT 2-02a
LIT 2-08a
LIT 2-09a

HWB 2-10a
HWB 2-12a

SCN 2-06a

TCH 2-04b

TCH 2-03a

- Homer is the latest space explorer robot. If you were to design a robot for space, what would you want it to do? Which planet would you want to see it explore? Using model-making techniques make a moving mock-up. There are opportunities here for persuasive writing too with brochures, patents and letters. You could create a Dragon's Den style show, where pupils need to present to a panel of Dragons and persuade them to fund their robot project.
- Contact manufacturers of computers and ask them questions about the latest developments in computer engineering – what will be the next 'craze'? Their websites have some information – use these to help hone research skills before emailing or writing to the companies for more information. You could also invite in someone from a local computer store, or a parent or guardian if anyone works in computing.
- Cosmos gives space weather forecasts. This one for Mars reads: "Today will be mostly clear with an average temperature of minus sixty Celsius. Possibility of ice storms in the area: very low. But dust storms could start from the central region and engulf the planet". Investigate the possibilities for other planets and design a forecaster board with symbols. Record classmates reading the forecasts.

CfE

TCH 2-14a

TCH 2-01a

SOC 2-12a

George And The Big Bang

George is delighted: his friends Annie and her father Eric have returned to the house next door as Eric is now working at Foxbridge University and is also on a task team investigating the Big Bang Theory using the Large Hadron Collider in Switzerland.

One of Annie and George's first tasks is to find Freddy, George's pet pig, a new home. He has outgrown his space in the garden and is now in a farm visitor attraction. He is miserable. Using Cosmos, they find an ideal unused cellar at the university but Cosmos' cameras and audio found the room full of shifty characters clearly unhappy with Eric's theories. What are they up to?

Both Annie and George start at new schools and George finds his first few days bewildering. Annie on the other hand appears to have a new friend - Vincent. He is older, handsome and the son of a film director. George dislikes him on sight!

George pops round to his friends one day to find no one home and a door to the universe propped open with one of Eric's slippers. Donning a spacesuit, George leaps out to join Eric and finds himself on the moon where they have a bit of fun with a moon buggy left from a previous expedition before taking a 'selfie' of themselves on the moon.

Shortly after their adventure, Eric gives his first lecture as head of Maths at

the University of Foxbridge. His lecture is declared a great success despite the protestors outside who all belong to the organisation TOERAG or Theory of Everything Resists Addition of Gravity. They are protesting about the experiments Eric is involved in regarding the Big Bang. Immediately after the lecture, Prof Zuzubin takes Eric aside and shows him photos of Eric and George on the moon picked up by a Chinese satellite. Eric is ordered to come before the Order of Science in Switzerland where they will decide if he should still be sole custodian of Cosmos.

A new arch enemy has been introduced: Eric's old mentor, Professor Zuzubin. He has secretly been working against Eric and the other scientists involved with the experiments at the Large Hadron Collider. Eric has been set up and is in big trouble. Cosmos is to be interrogated too! Dr Reaper continues to be involved, this time on Eric's side, but he has had to infiltrate TOERAG to help and as a consequence has been forced to build a bomb and hide this at the Large Hadron Collider.

Annie and George confront Zuzubin and are sent on a rather scary course to get to Eric in time. With the help of Vincent, they outwit the evil scientist and in a race against time manage to diffuse the bomb and ensure Eric's safety. The end of the novel leaves the reader wondering..?

LANGUAGE

Create your own arch enemy. Make Wanted posters; factfiles; mugshots; masterplans; dress up and hold an arch enemy convention where you plan dastardly deeds together, targeting specific superheroes.

ENG 2-31a

SCIENCE AND LANGUAGE

Investigate a famous astronomer or physicist. What role have they played in shaping our knowledge of the universe and beyond? Consider how this might be shared with another class. You could do the task as an interview with the physicist. You could also blog about your findings, setting up a project where other classes or schools read your blog and post replies.

SCN 2-20a

SCIENCE

- Eric collects a sample of moon rock to test out a theory he is developing. The Science and Technologies Facilities Council has a free of charge loan scheme for moon rock and meteor samples packs. A full support pack is provided with the samples. This would take any geology lesson to a higher level – engaging learners from the moment the box was opened. You must give four months' notice for your request which is rather long-term planning but would be a fantastic opportunity!

SCN 2-20a



www.stfc.ac.uk/1360.aspx

- Make a class study of the moon. Begin with basic facts before moving to more involved activities such as moon mosaic in photographs. Create models to help younger children better understand the moon's relationship with earth. Find out more about moon mosaic here:



www.schoolsobservatory.org.uk/activ/moonsaic
<http://nineplanets.org/luna.html>

- Investigate the Big Bang Theory and clarify the most recent findings. Use the Science and Technology Facilities Council website as a starting point. Order the booklet on the Big Bang Theory, mentioned at the start of this resource, to help. Offer choice in the method of sharing this information: pupils could record the story of the Big Bang as a storyboard, or create their own comic pages:



<http://mashable.com/2010/10/24/create-your-own-comics/>

SCIENCE AND HEALTH AND WELLBEING

Terence and Daisy, George's parents, are eternal eco optimists: they are determined to save our planet. What are you doing in your school to help? Are you registered with Eco Schools, the Co-Op's Green Revolution for Schools or another environmental organisation? Encourage your eco committee or pupil council to hold an eco day. What can you contribute as a class?

The Commonwealth Games are coming soon. Research which Commonwealth countries are at risk from rising sea levels, and find out what is being done to help.

Scottish Book Trust will be sending out a class set of our new graphic novel, John Muir: Earth, Life, Universe during April 2013. This resource will go to every school in Scotland. You can find more, including free learning resources to support the novel, at the address below:



www.scottishbooktrust.com/johnmuir

TRANSITION ACTIVITIES

Science Festival – why not arrange a Science Festival and invite in local 'experts' either space specific or widen out to other branches of science? Contact the feeder secondary school and arrange for visits to/from both schools. Invite senior secondary pupils to come in to work with the class. If funds allow, book a trip to a place of scientific interest, or invite organisations such as Generation Science to come in. The Royal Astronomical Society has a database of experts who are willing to come in to schools, many taking only travel expenses. Do read the advice given on the page before contacting any of the experts to be clear about the process and any costs. www.ras.org.uk/education-and-careers/for-schools-and-teachers/1834-list-of-school-speakers



There are also science centres in Glasgow, Dundee and Aberdeen.

Annie becomes very excited when her new space suit arrives: her previous one which was pink with sparkles had become a little tatty. Ask secondary and primary pupils to work together in researching space suits design and creating a 'costume' display of suits through the years. Perhaps design a new space suit. What must astronauts have in order to survive when working in space or when taking leisure breaks? Create a 'wonder-suit' with amazing new features, or jazz them up a bit to reflect your own personality, interests or characters.

There is more information about NASA's proposed new spacesuit designs here. There are different proposed designs for your pupils to discuss and vote for! Deadline is April 15 2014, but the article should still be available for you to use after this date:

 www.space.com/25231-nasa-z2-spacesuit-tech-design-vote.html

alternatively

Choose a character from your favourite novel e.g. Artemis Fowl or Dahl's Danny, and design a space suit for them. What would they need and why?

ENG 2-31a

Lucy Hawking Authors Live Event

- Prepare for the event by finding out about Lucy Hawking and her father Stephen: what is important to them? What questions might you have for Lucy? Plan to send your question in for the live event

SCN 2-20a

- Use a website such as the European Space Agency to offer students the opportunity to 'play' with space facts. Plan three questions each to research and report back to the rest of the class or group.

SCN 2-20b



<http://sci.esa.int/education/>

- Use The Daily What website to find out the latest scientific theories, click on Science and Technologies www.dailywhat.org.uk/. If you use your GLOW log-in you can take part in interactive content, comment on articles and join in discussions as and when relevant.

SCN 2-20b



- Find out what is currently happening with the Hubble telescope by logging in to the website. www.spacetelescope.org/

SCN 2-20b



DURING THE EVENT

Take notes on any aspect of space science you wish to learn more about. After the event research this further. If you have copies of Lucy's books, try to track down the information from there.

SCN 2-20b