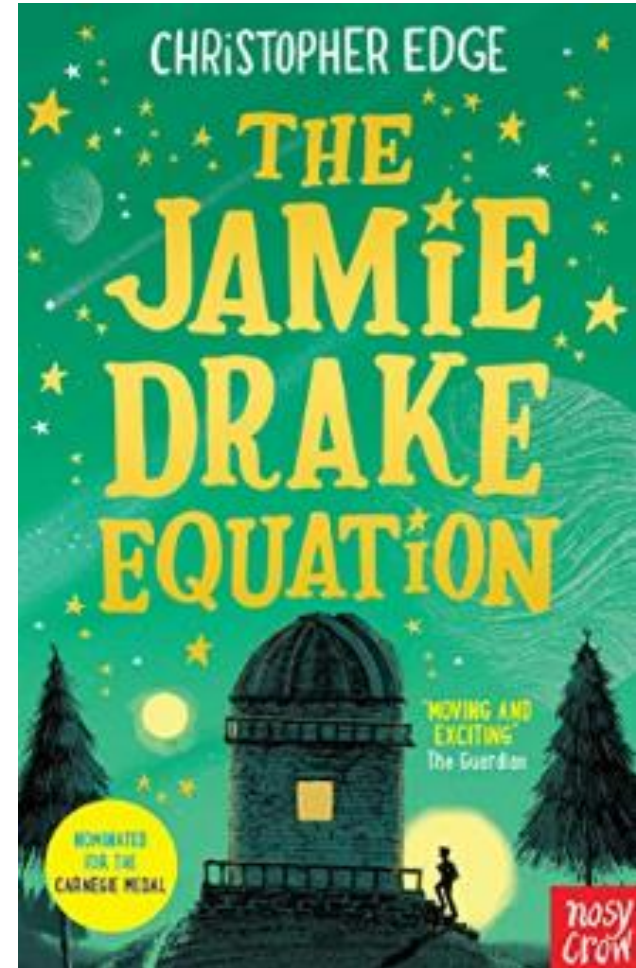


THE JAMIE DRAKE EQUATION

BY CHRISTOPHER EDGE

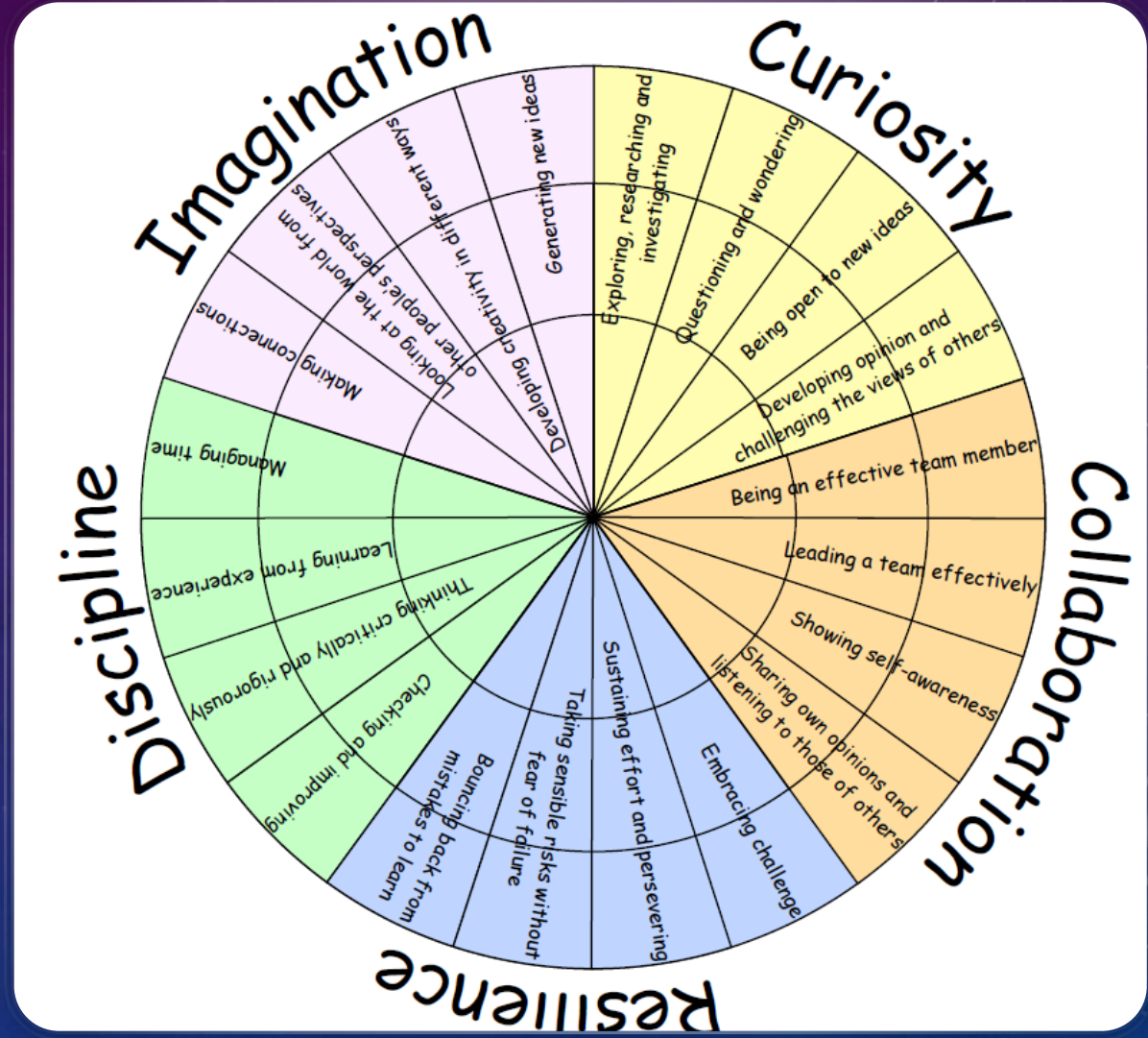


RESPONDER (15II)

- I can articulate personal responses to literature, identifying how and why a text affects the reader due to authorial intent

LEARNING HABITS

- What do you think is the most important Learning Habit?
- Is it one of your strengths or is it something you need to develop?
- How will you know that you have practised that Habit during the lesson?





"I thought you had a gun," I protest, starting to get up out of the seat.

"I've got a doctorate in astrophysics and a black belt in karate," the woman replies, poking me hard in the chest with her telescope. "So sit down before I knock your block off."

Now it might not be as big as the one that's pointing up out of the dome, but the end of this telescope still feels rather painful as she prods it into my chest. I sit back down.

"What are you doing here?" she asks again, staring sternly at me.

"My dad told me there used to be an observatory on Beacon Hill," I tell her, glancing round nervously at the old computer equipment. "I thought I'd come and take a look myself. I thought this place was abandoned. I didn't think anyone was still working here."

"It's private property. Didn't you see the sign?"

"No," I lie, suddenly remembering the warning about trespassers being prosecuted. "My dad said that this

place used to be open to the public. I can see now that it's all shut down, but what's that weird robot thing you've got outside? The rest of this place is proper old, but that thing looks brand new."

The woman ignores my question, suspicion still shining in her eyes.

"Who is your dad? Why's he told you to come poking around here?"

"He didn't tell me to come poking around." I start to pick my things up off the desk. "And now I know that this place is out of bounds, I'll get out of your way."

"But who is he?" She snatches my mobile phone out of my hand. "I'll call him up now to find out why he's sent you to spy on me."

"He didn't send me to spy on you," I repeat, raising my voice in exasperation. "And you can't phone my dad."

"Why not?" she says, peering intently at the mobile screen as she scrolls through the numbers in my contacts. "Scared I'm going to find out the truth?"

"Because he's in space," I snap. "My dad's Commander Dan Drake."

The woman stares at me for a second, her forehead creasing in a frown, and then she laughs out loud.

"I *knew* I recognised your face from somewhere," she replies. "You were in the newspaper with your dad – you and your mum and your little sister too – 'The Space Family Drake'."

I wince as I remember the headline. Before Dad went into orbit, *The Sunday Times* did a story about our whole family, talking about Dad's mission and how we felt about him going up into space. For the photograph the newspaper thought it would be a good idea if Charlie and me dressed up as aliens. Charlie loved it and kept on hitting Dad over the head with the lightsaber that the photographer gave her, but when you're in Year Six it's a bit embarrassing to have to wear pointy ears.

The woman slowly lowers her telescope and, for the first time, I start to think I might get out of here in one piece.

"What's your name?" she asks.

"Jamie," I reply. "Jamie Drake."

"That's right," the woman says, clicking her fingers as if pulling the memory back into focus. "In that photo with your dad you were dressed like a mini-Mr Spock out of *Star Trek* and your sister made the cutest little Yoda."

The pointy ears were embarrassing, but at least I didn't have to paint my face green like Charlie.

"But this still doesn't explain why you're trespassing," she continues, a trace of suspicion remaining in her voice. "What were you trying to do? Take a peek through the telescope at your dad up on the ISS?"

I shake my head. I might as well tell her the truth.

"I just thought it might be nice and quiet up here." And then I tell her about how I need to revise for my maths test tomorrow, how Granddad Neil still thinks he's a rock star and how it's kind of hard to concentrate when all you can hear is the squeal of a heavy metal guitar.

"So you thought you'd come and disturb my work instead?" the woman says with a frown.

I look around at the ancient equipment stacked haphazardly on metal racks and filling grey cabinets, all

covered in a thick layer of dust. It doesn't look like any of this stuff has been used in years. The only thing that looks brand new in here is a laptop that's set up at the other end of this desk. An external modem is plugged into one of its USB ports, the bright blue logo on this reading * L.O.G.S.

"What is your work?" I ask, still trying to understand exactly what she's doing here.

"Well, like, duh," the woman replies, gesturing towards the huge telescope. "Isn't it obvious? I'm an astronomer." There's the hint of a smile on her face as she hands me back my phone. "I'm Professor Forster."

Professor Forster doesn't look like I imagined an astronomer would look. She doesn't seem to act like one either. I thought they all had grey hair and spectacles and spoke in posh voices. Professor Forster is ... *different*.

"So what exactly are you looking for?" I ask, glancing up to see clouds scudding across the rectangle of sky still visible through the roof of the dome. "I mean, you can't see much from here."

"I'm waiting for the stars to give up their secrets," Professor Forster replies mysteriously. "I'm looking for a sign."

She perches on the desk next to me, tilting her head to one side as she fixes me with a quizzical stare.

"Have you ever wondered if we're all alone, Jamie?"

I glance nervously over my shoulder. Under the observatory dome the banks of electronic equipment lurk silently in the dim light, while the door leading to the stairs stands empty.

"I think we are," I reply, shifting uncomfortably in my seat. "I can't see anybody else here."

"I mean in the *universe!*" the astronomer explodes, making me nearly jump out of my seat. "What are the chances that Earth is the only planet where intelligent life exists?"

"So you're looking for aliens?" I say, quickly realising my mistake. I think about Dad getting ready for his space-walk on Friday. "Has this got something to do with my dad's mission? He's launching the Light Swarm probes to search for signs of alien life."

The astronomer shakes her head, a superior smile now playing across her lips.

"My work is a little more unofficial than Commander Drake's mission," she replies. "But, dare I say it, it has a much greater chance of success. Your father is sending those tiny spacecraft to Tau Ceti, a single star located twelve light years away. But the Milky Way measures one hundred thousand light years across and contains more than two hundred billion stars." She flings her arms wide with a flourish. "I'm searching the whole galaxy for a signal."

"What kind of a signal?" I ask, feeling kind of annoyed that she thinks she's got a better plan than my dad.

To answer my question, Professor Forster picks up a pen and grabs hold of my revision worksheet.

"We've been sending our own signals for about a hundred years," she explains, scrawling a circle in the space at the bottom of the page. In the middle of this circle she writes a single word: EARTH. "Every radio and TV transmission that the human race has ever broadcast leaks out of the Earth's atmosphere and travels into space at the speed of light." She draws a set of wavy lines, radiating out of the circle in every direction. "If any of our near neighbours in the Milky Way are listening out for these radio and TV signals, they'll be able to tell that there's intelligent life here on Earth."

Professor Forster now scribbles two asterisks on the worksheet, one close to the circle and the other near the edge of the page. She points her pen at the first of these.

"Proxima Centauri is only four and a quarter light years from Earth, so any aliens there might be watching an episode of *Doctor Who*." Professor Forster now moves her pen so it's pointing to the second, more distant star. "While any alien worlds orbiting 16 Cygni, a star system seventy light years away, will have only just heard about the end of the Second World War."

I imagine a real-life alien sitting down to watch *Doctor Who*. I just hope it's not a Dalek.

Professor Forster now starts scribbling new sets of wavy lines, radiating out from both of the asterisks on the page.

"And those aliens might be sending the same signals too."

Her voice echoes beneath the observatory dome, slowly fading into silence as I think about what this means.

"So that's what you're doing?" I say. "Trying to tune in to alien TV? What are the chances that you'll find the right channel?"

Still looking at my revision worksheet, Professor Forster laughs out loud.

"What's so funny?" I ask.

On the top of the page I've written my name JAMIE DRAKE next to the title EQUATIONS WORKSHEET, but I haven't started any of the sums. I don't know what she's laughing at.

"I thought you already had the answer written down here," Professor Forster replies. Using her pen, she circles two of the words at the top of the worksheet, cutting the "S" off the second.

DRAKE EQUATION

"An astronomer called Frank Drake came up with a sum to work out how many intelligent alien civilisations there might be in the Milky Way. We call this sum the 'Drake Equation'."

Flipping the worksheet over, Professor Forster starts to write a really complicated equation on this blank page.

$$N = R * x f_p x n_e x f_l x f_i x f_c x L$$

My brain starts hurting even before she finishes writing it out. There's a reason why me and equations don't get on. For a start, I don't even understand what any of these letters mean.

Ignoring the baffled expression on my face, Professor Forster starts to explain.

"It's really quite simple. The equation is trying to work out N, the number of alien civilisations that we might be able to receive signals from. To get the answer to this, Frank Drake came up with a list of things that would stop an alien species ever getting the chance to transmit their own TV signals. These are all the letters on the other side of the equation. They stand for the numbers of stars being formed in our galaxy, how many of these stars will have planets, how many of these planets can support life, how many of these will develop *intelligent* life, et cetera, et cetera. By multiplying all these factors together, the Drake Equation spits out the answer to your question of how

many alien TV stations we might be able to tune into.” She looks at me with a grin. “Now do you understand?”

Now, I reckon Professor Forster must have a brain the size of a small planet, but I still haven’t got a clue what she’s on about.

“Sort of,” I lie. “So how many aliens are out there according to this equation?”

“Well, the thing with the Drake Equation is that we have to estimate a lot of the numbers,” Professor Forster replies with a wave of her hand. “We don’t know exactly how many planets there are in the Milky Way, or how many of these are in the habitable zone of their star—”

“You mean in the Goldilocks zone?”

“That’s right,” she says, looking kind of impressed. “In fact, apart from the number of stars being formed, the rest of the numbers we plug into the equation are just intelligent guesses. So depending on who you ask, you get a different answer every time. Frank Drake reckoned there could be as many as ten thousand alien civilisations out there in the Milky Way.”

“Wow,” I say, my mind filling with images of aliens from all the science-fiction films and TV shows I’ve watched with my dad. “But if there are so many of them out there, then why haven’t we heard from them yet?”

“Well, space is a very big place,” Professor Forster says, an impish gleam returning to her gaze. “But who’s to say we haven’t already received a message from E.T.”

I sit right up in my chair.

“What do you mean?”

“Since the 1960s, we’ve been using radio telescopes to scan the skies in search of alien transmissions,” Professor Forster explains. “And in 1977 the Big Ear Observatory in the United States received an unusually strong radio signal from the direction of the constellation of Sagittarius. A seventy-two-second signal transmitted on a frequency that astronomers believe would be used by an alien civilisation attempting to communicate with other planets.”

My jaw drops open as I take in this mind-blowing information. I thought my dad’s mission was going to be the first to make contact with aliens. I didn’t know that E.T. had already phoned. Why didn’t they teach us this at school?

“What did the message say?”

“There was no information encoded in the signal,” Professor Forster replies. “It was a single-tone modulation – like a beacon beamed from the depths of space. The simplest way for any alien civilisation to say ‘We’re here.’”

The words echo in my head. *We’re here.* Maybe Minty is right after all. Maybe aliens really do exist.

“So who sent the signal?” I ask eagerly.

“We just don’t know,” Professor Forster sighs, glancing up at the hole in the roof of the observatory. “That one seventy-two-second burst of radio waves is the only signal we’ve ever received. Since then countless radio telescopes have tried to detect the signal again, but all we’ve heard is silence. If this was an alien civilisation calling, then they’ve hung up the phone.”

My initial excitement crumples into disappointment. I thought we’d actually made contact with aliens, not just heard a random burst of static from an outer-space radio station.

“Don’t worry,” Professor Forster says, seeing the frustration on my face. “We’re still listening and looking for signs of intelligent life. And we’ve got more than just radio telescopes to help us nowadays. As well as searching for radio signals, we’ve got telescopes scanning the sky for laser transmissions too. Our satellites now use lasers to transmit vast amounts of information across huge distances, so imagine what an alien civilisation could do with this technology. Maybe next time the aliens won’t just send a beacon signal – maybe they’ll send us their internet.”

I glance up at the huge telescope that towers above the astronomer like a rocket on a launch pad, its view of the stars now completely covered by clouds.

“But how can you see anything with this?” I ask.

Professor Forster glances around suspiciously as if checking that we’re alone, and then beckons me forward with her finger.

“Can you keep a secret, Jamie?” she says, dropping her voice low as if she’s scared of being overheard.

Leaning forward, I quickly nod that I can.

“That’s not the telescope I’m using to search for alien transmissions,” she whispers with a waggle of her finger. “This observatory is just the base for a mobile Laser Optical Ground Station that is hooked up to the Hubble Space Telescope.”

I remember the strange hi-tech machine that I saw outside, the mysterious letters on its side now making perfect sense. L.O.G.S. – Laser Optical Ground Station. That techno-spider was talking to the stars.

“The raw data from the Hubble Space Telescope is downloaded via satellite to the ground station,” Professor Forster explains, keeping her voice low. She gestures towards her laptop, the small blue light on the * L.O.G.S. modem flashing away. “I then analyse the data, searching for signs of extraterrestrial intelligence. If there’s an alien world out there that’s beaming laser signals into space, then the Hubble telescope will find it.”

“Wait a second,” I say, suddenly remembering the one big problem with this. “The Hubble Space Telescope stopped working last year. I know because my dad was in charge of Mission Control when the ISS astronauts tried to get it back online, but nothing worked.”

From behind her braids, Professor Forster’s smile now looks rather mischievous.

“I’m afraid that might have been down to me. The telescope didn’t exactly stop working – it just got a new owner.”

“You hacked the Hubble telescope?”

Professor Forster pulls a pained face as if deciding exactly what to say.

“Hacked is a bit of a loaded word,” she finally replies. “The Hubble Space Telescope was in line to be retired, but I figured out a way to extend its mission to help search for alien life. When NASA wouldn’t listen, I decided to take matters into my own hands.”

“You hacked the Hubble telescope,” I repeat, unable to believe what I’m hearing. “My dad said that that tele-

scope cost ten billion pounds and you've just taken it for a joyride to look for little green men."

A worried frown creeps across the astronomer's face.

"You won't tell anyone, will you?"

Now it's my turn to grin.

"Why would I?" I laugh. "It's a brilliant idea! Have you found anything yet?"

With a sigh of relief, Professor Forster shakes her head.

"No, not yet," she replies. "But the latest download from Hubble is arriving now. Maybe in all this new data coming through, we'll find someone trying to say hello." She turns back towards her laptop and then tuts out loud.

"What's the matter?" I ask.

"Minor technical difficulties," Professor Forster replies, moving towards the door. "I just need to make a quick check on the ground station system outside." She pauses in the doorway, turning back to fix me with a warning stare. "Don't touch anything while I'm gone."

I hold up my hands.

"Don't worry about me. I'm not the one who steals satellites."

Raising an eyebrow in my direction, Professor Forster disappears through the door, the sound of her footsteps echoing through the observatory as she descends the stairs. But as I shake my head in disbelief at what I've discovered here, I hear a beep from my mobile phone.

Thinking this will be Mum checking up on me, I glance down at the home screen. But instead of a text, I see the low battery icon telling me that I've only got five per cent charge left. It will take me a good twenty minutes to walk home and if Mum can't get hold of me she'll only start to worry, so I need to recharge this phone.

Looking around, my eyes fall on Professor Forster's laptop. On its screen I can see a stream of data scrolling down, the * **L.O.G.S.** modem plugged into the laptop still flashing away. But next to this, another USB cable dangles empty...

With a quick glance over my shoulder to check that the coast is clear, I plug the other end of this cable into my

mobile phone. A quick five-minute charge should give enough battery life to see me home. But as the USB connects with the familiar three-note sound, I see a pop-up box suddenly appear on the laptop screen.

```
DATALINK CONNECTED
INCOMING TRANSMISSION FROM
HUBBLE SPACE TELESCOPE
DOWNLOADING TO DEVICE
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Oh no. No, no, no. I don't want to connect my phone to the Hubble Space Telescope – I just want to recharge it. Leaning forward, I slide my finger across the laptop's touchpad, searching the screen for the cursor to close this window down. But before I can find it, I hear the sound of footsteps climbing back up the stairs.

Panicking, I make a grab for my phone, quickly yanking the USB cable out but in the process knocking over a nearby mug of tea. As the spilt liquid chugs across the desk, Professor Forster appears in the doorway.

"Just a glitch in the ground station feed," she announces. Then she sees me standing over her laptop, a pool of tea spreading from the upturned mug and dripping on to the floor. "What have you done?"

"I'm sorry," I say, grabbing hold of my revision worksheet to try and rescue it from the flood. "I just—"

Righting the mug, Professor Forster quickly pulls a handkerchief out of her cardigan pocket to try and mop up the spill. On her tea-splattered laptop, a stream of data is still rolling down the screen as the * **L.O.G.S.** modem blinks on and off.

"This is supposed to be a working observatory," she snaps. "Not some after-school homework club. I think you'd better go, Jamie, before you cause any more damage."

Feeling my cheeks burn, I snatch up the rest of my stuff from the desk, and as Professor Forster wipes down her laptop, I make a run for the door.

DEDUCTION

1. Why did Jamie lie when the woman asked him whether he had seen the sign warning him to stay out?
2. What does the woman's insistence on finding out who Jamie's dad is tell you about her feelings at this point?
3. Why did the woman recognise Jamie?
4. Why did Charlie (Jamie's sister) wear green ears in the photograph in the newspaper?
5. Why is Professor Forster not like Jamie expected an astronomer to be?
6. What is Professor Forster looking for?
7. How does this connect to what Jamie's dad is going to do on Friday?
8. What do you think happens when the message pops up on the laptop screen saying:
DATALINK CONNECTED?

PREDICTION

9. What will happen in the next chapter? Why do you think this?

DEDUCTION

1. Because he might get into trouble if he said that he had seen it but still gone in.
2. She is very agitated with Jamie and she thinks that his dad might be spying on her.
3. He had been in a photograph in the newspaper with his dad.
4. So she looked like Yoda (from Star Wars).
5. He thought that they all had grey hair, spectacle and talked with a posh voice.
6. Signals from aliens.
7. He is sending probes out into the galaxy to look for aliens too.
8. Information was downloaded to Jamie's phone which could lead to the aliens talking to him directly.

PREDICTION

9. ?

HOMEWORK

WHAT IS THE
GOLDILOCKS ZONE?

WHY IS THIS IMPORTANT
TO THE STORY?

LISTEN TO CHAPTERS 7, 8
AND 9 ON THE
SCOTHOLME PODCAST
CHANNEL.