14 December

GCHQ

#GCHQChristmasChallenge

Schools' Challenge Pack 2023

Welcome to the GCHQ Christmas Challenge 2023. This pack will guide you through how to take part in the Challenge on the 14 December, including planning your lessons and bonus case studies.

You can download the Challenge itself, the hints sheet, worksheets, videos and certificates from this website. The solutions will be shared on the same page on the 15 December.

Any issues? Contact us; xmaschallenge@gchq.gov.uk

Schools pack contents



About the GCHQ Christmas Challenge

The GCHQ Christmas Challenge is a series of festive puzzles aimed at school children (ages 11-18).

Your students' mission, should they choose to accept it, is to crack all seven puzzles in our GCHQ Christmas Challenge to uncover our secret seasonal message. The challenge is not designed to be solved alone – students will need to work as a team to crack the codes. It's okay to ask for help, for hints and to work together.

At GCHQ, we bring together people with lots of different skills and perspectives in our mission to help keep the country safe. From codebreaking to maths, from languages to analysis, it's our diverse mix of minds that enables us to solve seemingly impossible problems every day.



GCHQ

#GCHQChristmasChallenge

The GCHQ Christmas Challenge

About GCHQ

The Government Communications Headquarters (GCHQ for short) is one of the three UK Intelligence and Security Agencies, along with MI5 and the Secret Intelligence Service (MI6).

GCHQ protects the UK and its citizens from individuals, groups and countries who wish to do us harm, or damage us financially. We work round the clock to help to keep the country safe.

Our brilliant people use cutting-edge technology, technical know-how and wide-ranging partnerships to identify, analyse and disrupt threats. We always strive to stay one step ahead. Find out more about what we do.

Planning your lessons

We'd recommend allowing 45 minutes to 90 minutes for your pupils to have a go at the GCHQ Christmas Challenge. The puzzles can be tackled in an after-school club, or perhaps as part of a maths or a computer science lesson.

Pupils should be encouraged to work on the challenge in small teams – from 2 to 8. The size of teams will depend on the abilities within the class. This will also influence how long it takes the class to solve the puzzle.

Each pupil will bring different strengths, perspectives and ways of tackling the puzzles. There's no shame in checking the hints sheet either!

Don't forget to watch the good luck videos from GCHQ's Director and our Chief Puzzler and download the hints sheet.

Lesson plans

Detailed lesson plans for KS3 and KS4, including learning objectives are attached to this pack.

Other resources

As part of the lesson, we recommend exploring how GCHQ keeps the country safe from terrorists, cyber threats and hostile states, and what skills our people need. You can find information on our employees in the case studies section of this pack, and more about GCHQ's mission here.

Spread the word

On the day - join in on social media!

Let people know that your school is taking part in the GCHQ Christmas Challenge on Thursday 14 December.

Don't forget to tag us (@gchq on X and Instagram), using the hashtag #GCHQChristmasChallenge. Let us know if you get stuck and we'll be on hand with hints. We'd also love to see photos of your school taking part.

Why not challenge other schools in your area to join in the fun too. Who can be first to solve the challenge?

For your website / newsletter (suggested wording)

We're taking part in the annual #GCHQChristmasChallenge on Thursday 14 December. Students will be set the task of cracking seven fiendish puzzles and using the answers to help uncover a hidden festive message! You can have a go at home too; the challenge will be available for anyone to download on the GCHQ website from Thursday 14 December.

FAQs

What age is the Christmas Challenge for?

The GCHQ Christmas Challenge is aimed at pupils aged 11-18, but it is also suitable for some primary pupils aged 10-11. Plenty of adults enjoy having a go too, which is why we also release our Challenge to the public every year.

Can I take part on another day?

We like to keep our Christmas Challenge under wraps until the 14 December, so we're asking teachers and students to use their best spy skills to keep it a secret until then. You can take part at any time from the 14 December onwards.

Where can I find the answers?

The answers will be published on the website on the morning of the 15 December. Watch out for spoilers – you might spot some people sharing the answers on social media on the 14 December.

Help, my class finished early, what should I do now?

You could ask them to think about what skills they think they might need to become a spy, then get them to explore the case studies included in this pack and see how they compare. You can also find more puzzles to keep them busy on our website.

Where can I find more puzzles like these?

There are lots more puzzles on our website, including these brainteasers.

Why does GCHQ create puzzles?

Solving the seemingly impossible is part and parcel of GCHQ's work to keep the country safe. Many of our workforce like to keep their minds sharp by both creating and solving puzzles for fun.

How do I get in touch or give feedback?

We'll be sending out feedback forms to everyone who registered for the Christmas Challenge, but do e-mail us if there's anything you'd like to mention. xmaschallenge@gchq.gov.uk

Spy Skills

Learn more about the people who work at GCHQ who help us keep the country safe

The GCHQ Christmas Challenge

I always really enjoyed STEM subjects at school, whether learning about the universe, or learning about mechanics of things in my science classes. I studied Computing & Electronics at college - it was what I learnt at this point which helped me to shape what I do now, developing software.

At GCHQ, a day passes very much like a day in any other office. You get in, have a coffee, catch up on emails, get your head down for some work, talk to colleagues, make calls, attend meetings etc. The main difference is that in the office there are some things you can't talk about openly, and some doors you need permission to go inside, and most importantly can't go home and tell anyone what you do - I find that quite cool!

As a software developer I spend most of my day at my desk writing code and working on adjacent projects like managing a system or deploying a new one, as well as going on trips to other locations to learn about how something works or simply training.

Oh yes.... a hint for these puzzles! Having a cup of proper tea in a certain English county might be a helping hand for puzzle number three!

Merry Christmas - JJ

JJ – *he/him*
Software Engineer

Marie – *she/her*
Linguist

I'm Marie and I've been a Language Analyst at GCHQ for sixteen years. I discovered a love for language learning at secondary school, thanks to a particularly fantastic teacher, and that inspired me to study modern foreign languages. Fast forward a bit, and a year working overseas during my degree propelled my practical language skills to another level - I then found myself at GCHQ!

Being a language analyst is about so much more than translation and transcription - I'm expected to combine my language skills with knowledge of culture, politics and history, to deliver insights that inform UK government policy and decision-making. I'm a core part of a wider operational team, regularly collaborating with analysts, operational leads, intelligence coordinators and fellow language analysts on work that has real world impact.

During my career, I've been the person with the first-hand understanding of a subject of interest, briefing very important people on the very latest information. I've worked around the world exchanging best practice and learning with colleagues and international partners. Every day brings new challenges and learning opportunities, and that variety is what keeps me coming back. I can't believe that I get to use what I learnt in school and be valued for my language skills every single day, and I feel incredibly lucky to do this job.

A hint! Oh yes – once you've worked out the code in puzzle 7... a word should be staring right at you.

Merry Christmas - Marie

Lesson Title: GCHQ Christmas Challenge KS3

Subject: Multiple Applicable.	Year Group: Key Stage 3	Lesson 1 of 1. However, up to 1-2 hours so can be split.

Learning Objective	Resource
To attempt 7 GCHQ puzzles, to learn about people's problem-solving strengths, and how each puzzle requires a different approach.	Attached GCHQ Christmas Challenge (no answers provided). This resource is not only about solving the puzzle but the process of how to go about solving them. Attached hints sheet. Attached work sheet. Attached case studies.

Teaching Input

There are 7 puzzles in total, with one final puzzle to reveal the festive message. Each puzzle should take an average of 10-15 minutes to complete, in a mixed ability group of 4.

Given the nature of the puzzles, it is likely as they are solved the methodology will spread quickly amongst the classroom. If this is not the outcome you want, you can set different groups to solve different questions.

It is suggested that the teacher either sort groups into mixed abilities or vary the size of the groups. The suggested group size of 4 is aimed at upper KS3 of mixed ability therefore regulate as appropriate to ability.

The main difference between the suggested approach for key stage 3 and 4 is group size to tackle the puzzles. As these puzzles are aimed at an age range of 11-18, group size and time are the largest factors of change when tackling the task.

Main Activity

Lower Ability	Middle Ability	Higher Ability
Should be paired with a higher ability pupil who is able to explain their thought process. If the group is of lower KS3, and/or not engaging in small groups well, it may be more appropriate to tackle the puzzles as a classroom approach.	This group of pupils will make up the majority of groups and should be able to tackle the puzzles with good teamwork.	This can be a useful task for high ability users to focus not only on the task but on their team working ability. If the classroom consists of a lot of high ability pupils, it may be better to allow them to attempt the task solo.

Each of the puzzle questions are different in nature, some are logic based some are language or mathematical based. The puzzles have been selected to appeal to a wide range skill sets.

Plenary	Assessment Questions
Engage with the class and ask them questions about GCHQ Examples may include; What does GCHQ stand for? What role does GCHQ serve? How old is GCHQ? If GCHQ is one of 3 UK intelligence agencies, what are the other 2 called?	The teacher should do an understating check on not only the perceived answer but how it was achieved.

National Curriculum Links

Teamwork

Mathematic

Language

Music

Science

(expanding on the above would give too many clues to the puzzles and the answers are not provided)

Notes:

Also included in the teaching pack are a number of case studies of people who've used their skills (Maths, Language, Computing) to go on to a career at GCHQ. Teachers can use these to talk about subject options/further education, as well as raising pupils' aspirations when studying STEM subjects.

GCHQ Christmas Challenge KS4

Subject: Multiple Applicable.	Year Group: KS4	Lesson 1 of 1 however up to 1.5 hours so can be split

Learning Objective	Resource
To attempt 7 GCHQ puzzles, to learn about people's problem-solving strengths around them and how each puzzle requires a different approach.	Attached GCHQ Christmas Challenge (no answers provided). This resource is not only about solving the puzzle but the process of how to go about solving them. Attached hints sheet. Attached work sheet. Attached case studies.

Teaching Input

There are 7 puzzles in total, with one final puzzle to reveal the festive message. Each puzzle should take an average of 10-15 minutes to complete, in a mixed ability group of 4.

Given the nature of the puzzles, it is likely as they are solved the methodology will spread quickly amongst the classroom. If this is not the outcome you want, you can set different groups to solve different questions.

It is suggested that the teacher either sort groups into mixed abilities or vary the size of the groups. The suggested groups of 2 is aimed at GCSE Students of mixed ability therefore regulate as appropriate to ability.

The main difference between the suggested approach for key stage 3 and 4 is group size to tackle the puzzles. As these puzzles are aimed at an age range of 11-18 group size and time are the largest factors of change when tackling the task.

Main Activity

Lower Ability	Middle Ability	Higher Ability
Should be paired with a higher ability pupil who is able to explain their though process. If the group is struggling or not engaging in small groups well, it may be better to tackle the puzzles as a classroom approach.	This group of pupils will make up the majority of groups and should be able to tackle the puzzles with good teamwork.	This can be a useful task for high ability users to focus not only on the task but on their team working ability. If the classroom consists of a lot of high ability pupils, it may be better to allow them to attempt the task solo.

Each of the puzzle questions are different in nature, some are logic based some are language or mathematical based. The puzzles have been selected to appeal to a wide range skill sets.

Plenary	Assessment Questions
Engage with the class and ask them questions about GCHQ Examples may include What does GCHQ stand for? What role does GCHQ serve? How old is GCHQ? If GCHQ is one of 3 UK intelligence agencies what are the other 2 called?	The teacher should do an understating check on not only the perceived answer but how it was achieved.

National Curriculum Links

Teamwork

Mathematic

Language

Music

Science

(expanding on the above would give too many clues to the puzzles and the answers are not provided)

Notes:

Also included in the teaching pack are a number of case studies of people who've used their skills (Maths, Language, Computing) to go on to a career at GCHQ. Teachers can use these to talk about subject options/further education, as well as raising pupils' aspirations when studying STEM subjects.