INSPIRE

ELIMINATION!
ACTIVITY

Age: KS4

Lesson overview

This task is designed to help students use reasoning, logic and deduction via the process of elimination. The table provides a clear way of organising information and will help them work towards the correct answer.

While the subject of this puzzle is centred on working in a large corporation, the skills honed during the exercise are transferable to other situations where the solving of multiple clues by deduction is necessary.

It will help students approach problems in a systematic and organised manner, using deductive reasoning rather than trial and error.

Learning objectives

▶ Use of analysis and evaluation;
▶ Use of scientific/logical thinking;
▶ Development of teamwork;
▶ Consideration of citizenship and social responsibility;
▶ Logical step-by-step deduction;
▶ Follow written instructions and decipher a solution;
▶ Spoken persuasion and explanation

Subjects

Mathematics (mathematical reasoning and handling data)
Citizenship studies / PSHE (develop employability skills)
English (effectively present ideas)

HPC Inspire

Inspire is Hinkley Point C's Education Programme in Somerset and the wider South West region. We offer a range of free and innovative activities – including hands-on STEM workshops, assemblies, events and resources – to help young people take advantage of the huge opportunities that the construction and operation of Hinkley Point C has to offer.
www.edfenergy.com/hpcinspire

HINKLEY POINT C

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Employability skills

▶ **A positive attitude** – Show a 'can do' attitude, be proactive and demonstrate a willingness to try out new things.

▶ **Team working** – Show willingness to cooperate with us and work together to achieve shared goals.

▶ **Problem solving** – Be proactive in coming up with solutions, willing to test new ideas and work to overcome challenges.

▶ **Communication** – Understand how to communicate with others in the workplace and use appropriate language and context in dealing with others.

Gatsby Benchmarks

4: Linking curriculum learning to careers: One of the homework suggestions includes ideas for researching jobs in project management.

5: Encounters with employers and employees: This Benchmark is achievable for those students who combine the activity with learning more about the structure of their work placement organisation and speaking to real-life project managers.

Timings

1 hour, although It is up to you how long you allow students to complete this task (they could potentially finish it for homework, for example). A separate session about the theory of deductive reasoning might prove a useful warm up before you start. Working through the first part of the puzzle with students will also direct them well.

Materials and set-up

▶ **Student handout:** a summary of the task with hints on how to solve the puzzle
▶ **Student worksheet:** the grid they need to fill in with the answers
▶ These **Teacher notes**

How to run this activity

This task could be incentivised through competition – make it a race to finish first!

An advanced 'detecting' version could also be fun. Give one student one of the analysts' identities and challenge them to throw the others off the correct course without revealing their project, room name, subject area or nationality of their project manager.

This challenge could form part of students' learning in:
▶ **English**
▶ **Mathematics**
▶ **Computational thinking**[1]
▶ **Enrichment week:** It's a good activity for encouraging teamwork and could have a strong competitive element
▶ **Work experience:** Ask students to consider the set-up and structure of the organisations where they carry out work experience. Are there any real-life project managers in the company they could talk to about their role and what skills it involves?
▶ **Cross-curricular lesson link: History:** Aristotle's writings about logic in the 4th century BC first documented deductive reasoning.

Homework suggestions

1. Think about the following questions.

▶ When is a company considered large? What is an SME?
▶ What advantages might there be to working for a big company?
▶ What other types of tests might companies ask applicants to take?[2]
▶ What are the advantages to working in a team?

2. Research the role of a business project manager. What are the key responsibilities of the job? A good starting point might be this job description on the National Careers Service website: **https://nationalcareersservice.direct. gov.uk/job-profiles/business-project-manager**.

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[1] https://community.computingatschool.org.uk/files/8221/original.pdf
[2] https://targetjobs.co.uk/careers-advice/psychometric-tests/275677-psychometric-tests-what-they-are-and-why-graduates-need-to-know

The task: Complete the table in order to answer the following questions:

Q. Which project manager does Ali work for?

Q. Which project room is 'Project Hawking' based in?

1	There are five major projects currently operating in EDF Energy
2	The Welsh project manager is based in the Hartlepool room
3	The Chinese project manager has the project analyst named Claire in the team
4	'Project Einstein' is based in the Hunterston room
5	The Russian project manager is in charge of 'Project Curie'
6	The Hunterston room is immediately to the right of the Heysham room
7	The analyst named Katy works on the project about thermodynamics
8	The project aimed at improving sustainability is based in the West Burton room
9	'Project Bohr' is managed in the middle project room
10	The Scottish project manager is based in the first room
11	The project about wind power is based in the room next to the project room that has an analyst named Jo
12	The sustainability project is based in a room next to the room where the analyst named Rich works
13	'Project Newton' is aimed at improving customer satisfaction
14	The French project manager is overseeing the project aimed at improving health and safety
15	The Scottish project manager's room is based next to the Dungeness room

Assessor guide

Here are some deductive steps to deriving the answers. A useful method is to try and fit known relationships into a table and eliminate possibilities. Key deductions are in **red** in the following tables. Students should use the hints and tips if they get stuck, and you could also help with the Clue Cards at each step (see below).

Step 1

We are told the Scottish project manager is based in the first room (10). From (10) and (15), the 2nd room is the Dungeness Room. What room name is the 1st project office? Not Heysham or Hunterston, because they have to be next to each other (6 and the 2nd office is Dungeness). Not Hartlepool, because the Welsh project manager is based there (2). **Therefore the 1st project office is the West Burton Room.**

> **CLUE CARD. #1: You should be able to work out the room name of the first room by reviewing the clues referencing room names.**

It therefore follows that the project aimed on improving sustainability is in the 1st room (8) and that the analyst named Rich is based in the 2nd room (12).

So what is the 'Project Name' managed by the Scottish project manager in the 1st room (in West Burton room, about improving sustainability)? Not 'Project Curie' since the Russian manages that (5). Not 'Project Einstein' since that is managed in the Hunterston Room (4). Not 'Project Bohr' since that is managed in the 3rd room (9). Not 'Project Newton' as that is aimed at improving customer satisfaction (13).

Therefore, by the process of elimination it must be 'Project Hawking' (unmentioned in the actual clues) that is managed by the Scottish project manager.

	1	2	3	4	5
Room	**West Burton Room**	Dungeness Room			
Project Mgr	Scottish				
Project Name	**Project Hawking**		Project Bohr		
Topic	Sustainability				
Analyst		Rich			

Step 2

So what kind of project is in the 2nd room (Dungeness room) where we know Rich the analyst is based? Not sustainability as this is managed in the 1st room (8). Not thermodynamics since that project has an analyst named Katy (7).

Let's suppose the project about customer satisfaction is managed there, which means this is where 'Project Newton' is located (13). Then consider: Who is the Project Manager? Not the Scottish manager since he is based in the 1st room (10). Not the Welsh manager since he is based in the Hartlepool room (2). Not the Chinese manger since he has an analyst named Claire (3). Not the Russian since he manages 'Project Curie' (4). Not the French manager who is in charge of a project about health and safety (14). Since this is an impossible situation, the project aimed at improving customer satisfaction can NOT be based in the 2nd room.

Let's suppose the project about health and safety is managed there, which means the French manager is based here (14). Then consider: What is the Project Name here? Not 'Project Curie' since the Russian manages that (5). Not 'Project Einstein' since that is based in the Hunterston room (4). Not 'Project Bohr' since that is based in the 3rd room (9). Not 'Project Newton' since that is on the topic of customer satisfaction (13). Again, since this is an impossible situation, the project about health and safety is NOT based in the 2nd room.

Therefore, **the project about wind power is based in the 2nd room**.

So who is the Project Manager in the 2nd room (Dungeness Room) who owns the project about wind power, and has an analyst named Rich? Not the Scottish manager who is based in the 1st room (10). Not the Welsh manager who is based in the Hartlepool room (2). Not the Chinese manager who has an analyst named Claire (3). Not the French manager who runs a project about health and safety (14).

Therefore, **the Russian manager must be based in the 2nd room, where he/she runs 'Project Curie'**(5).

	1	2	3	4	5
Room	West Burton Room	Dungeness Room			
Project Mgr	Scottish	**Russian**			
Project Name	Project Hawking	**Project Curie**	Project Bohr		
Topic	Sustainability	**Wind power**			
Analyst		Rich			

Step 3

Since the project about wind power is based in the 2nd room, we know from (11) that the analyst named Jo is based in either the 1st room or the 3rd room.

Let us first assume that the analyst named Jo is based in the 3rd room. Then consider: what is the 'Project Name' that looks at thermodynamics and has the analyst named Katy (7)? We have already ruled out 'Project Hawking' and 'Project Curie' from the above steps. It cannot be 'Project Newton' since that is about improving customer satisfaction (13). It cannot be 'Project Bohr' because that is based in the 3rd room (9) where we have assumed Jo is based. This leaves 'Project Einstein', which we know is based in the Hunterston room (4).

So if Jo is based in the 3rd room, then someone supposedly runs a project about thermodynamics with an analyst named Katy, called 'Project Einstein' in the Hunterston room. Who can this person be? Not the Scottish manager who is based in the 1st room (10).

Not the Russian who manages 'Project Curie' (5). Not the Welsh manager who is based in the Hartlepool room (2). Not the French manager who runs a project about health and safety (14). Not the Chinese manager who has an analyst named Claire (3). This is impossible. So it follows that if Jo is not based in the 3rd room, then **Jo must be based in the 1st room**.

> **CLUE CARD #5: Which room is Jo based in? When deciding this, consider Katy, and the possible (or impossible) scenarios of her 'Project Name' and Project Manager.**

	1	2	3	4	5
Room	West Burton Room	Dungeness Room			
Project Mgr	Scottish	Russian			
Project Name	Project Hawking	Project Curie	Project Bohr		
Topic	Sustainability	Wind power			
Analyst	**Jo**	Rich			

Step 4

From what we have found so far, we know that 'Project Newton' and 'Project Einstein' are based in the 4th and 5th rooms. It doesn't matter which is in which for now; we will just refer to them as the Newton room and the Einstein room.

So in which room is the project about thermodynamics with the analyst named Katy? Not the Newton room as this has a project about improving customer satisfaction (13).

So let's consider the Einstein room. Then we would have a project about thermodynamics, with an analyst named Katy, called 'Project Einstein' in the Hunterston room (4). Again, by the same reasoning in step 3 (i.e. elimination of all possible project managers), this is impossible. Therefore, **the project about thermodynamics, with the analyst named Katy, must be based in the third room**, as this has 'Project Bohr'.

CLUE CARD #6: Consider the Project Name for Katy: What is possible/impossible?					
	1	**2**	**3**	**4**	**5**
Room	West Burton Room	Dungeness Room			
Project Mgr	Scottish	Russian			
Project Name	Project Hawking	Project Curie	Project Bohr		
Topic	Sustainability	Wind power	**Thermodynamics**		
Analyst	Jo	Rich	**Katy**		

It follows that the project about health and safety is based in Hunterston room, named 'Project Einstein' and managed by the French manager (14) (4), as 'Project Newton' is about customer satisfaction (13). This means the Chinese manager must be in charge of 'Project Newton', about customer satisfaction and has the analyst named Claire (3). By extension, the Welsh manager must be based in the third room, which is the Hartlepool room. By process of elimination, the Chinese manager's room is the Heysham room. By now we have filled in every variable except one, and it is clear that the **French manager has the analyst named Ali**.

	1	**2**	**3**	**4**	**5**
Room	West Burton Room	Dungeness Room	Hartlepool Room	Heysham Room	Hunterston Rm
Project Mgr	Scottish	Russian	Welsh	Chinese	French
Project Name	Project Hawking	Project Curie	Project Bohr	Project Newton	Project Einstein
Topic	Sustainability	Wind power	Thermodynamics	Customer satisfaction	Health & safety
Analyst	Jo	Rich	Katy	Claire	Ali

Alternative method towards the end

If left with just rooms 4 and 5. For simplicity let's first check what the possible answers are for rooms 4 and 5:
▶ **Project Rooms:** Hunterston, Heysham
▶ **Project Manager:** Chinese, French
▶ **Project Names:** 'Newton, 'Einstein'
▶ **Topics:** health and safety, customer satisfaction
▶ **Analysts:** Claire, Ali

If we continue to follow our simple logic of deduction, by (6) we can say that the 4th room cannot be Hunterston as it has to be to the right of the Heysham room, which makes the 4th room Heysham. Therefore, the only option left is that the 5th room is Hunterston.

Similarly by (4) we know that 'Project Einstein' is based in the fifth room, the Hunterston Room. Therefore, 'Project Newton', the only project name left, must be based in 4th room. By (13) the 4th room must have the project about customer satisfaction, which implies that the 5th room must be about health and safety. Therefore (14), the 5th room has the French manager, which makes the 4th room the base for the Chinese manager. By (3), the 4th room has the analyst named Claire which makes the only remaining analyst Ali for the 5th room.

CURRICULUM LINKS

Elimination is primarily a skills-based activity, which will support students' ability to reason and use logic to reach the correct answers. As such, it indirectly supports students in meeting the following objectives / outcomes:

AQA GCSE Mathematics

4.1 Aims and learning outcomes

3 reason mathematically, make deductions and inferences and draw conclusions

4.2 Assessment objectives

AO2: Reason, interpret and communicate mathematically
Students should be able to:
▶ make deductions, inferences and draw conclusions from mathematical information
▶ construct chains of reasoning to achieve a given result

Edexcel GCSE (9-1) Mathematics

As above and:

AO3 Solve problems within mathematics and in other contexts
3 – Interpret results in the context of the given problem
4 – Evaluate methods used and results obtained
5 – Evaluate solutions to identify how they may have been affected by assumptions made

CCEA GCSE in Mathematics

As above and:

3.1 Unit M1: Foundation Tier

Handling data

▶ extract data from printed tables and lists;

WJEC GCSE in Mathematics – Numeracy

3.1 Assessment objectives

AO3 Interpret and analyse problems and generate strategies to solve them

▶ Devise strategies to solve non-routine or unfamiliar problems, breaking them into smaller, more manageable tasks, where necessary.
▶ Construct arguments and proofs using logical deduction.
▶ Interpret findings or solutions in the context of the original problem.
▶ Use inferences and deductions made from mathematical information to draw conclusions.
▶ Reflect on results and evaluate the methods employed.

SQA National 4 Mathematics

Numeracy (National 4)

Outcome 2
The learner will:
2 Interpret graphical data and situations involving probability to solve straightforward, real-life problems involving money/time/measurement by:
2.3 Making and explaining decisions based on probability

AQA GCSE Citizenship Studies

3.1 Citizenship skills, processes and methods

Through studying GCSE Citizenship Studies students will:
▶ select and organise their knowledge and understanding in responses and analysis, when creating and communicating their own arguments, explaining hypotheses, ideas and different viewpoints and perspectives, countering viewpoints they do not support, giving reasons and justifying conclusions drawn

PSHE Key Stage 4 (England)

Core theme 3: Living in the wider world

Building on Key Stage 3, pupils should have the opportunity to learn:
L1. to evaluate their own personal strengths and areas for development and to use this to inform goal setting
L10. how their strengths, interests, skills and qualities are changing and how these relate to future employability
L12. to further develop study and employability skills (including time management, self-organisation and presentation, project planning, team-working, networking and managing online presence)

AQA GCSE English Language

3.1 Scope of study

3.1.3 Spoken language

▶ presenting information and ideas: selecting and organising information and ideas effectively and persuasively for prepared spoken presentations; planning effectively for different purposes and audiences; making presentations and speeches
▶ responding to spoken language: listening to and responding appropriately to any questions and feedback
▶ spoken Standard English: expressing ideas using Standard English whenever and wherever appropriate.

4.5 Assessment objectives

AO9: Use spoken Standard English effectively in speeches and presentations.

English Language GCSE Wales only (from 2015)

1.1 Aims and objectives
This GCSE specification in English language will enable learners to:
▶ demonstrate oracy (speaking and listening), reading and writing skills that are instrumental in communicating with others confidently, effectively, precisely and appropriately
▶ develop their skills in order to meet their own personal needs as well as the needs of employers and further education so that they can fully participate in society and the world of work
▶ develop their verbal reasoning and their ability to think constructively and critically in response to written and digital/dynamic texts

Oracy skills
▶ Present information and select/organise information and ideas effectively and persuasively, e.g. for a prepared spoken presentation or group discussion.
▶ Use verbal reasoning skills, form independent views and demonstrate effective listening skills by summarising
key points, challenging what is heard on the grounds of reason, evidence or argument.

CCEA English Language GCSE

Unit 2: Speaking and listening

7 Curriculum objectives

7.1 Cross-curricular skills at Key Stage 4

Communication
Students should be able to:
▶ make oral and written summaries, reports and presentations, taking account of audience and purpose, for example in Speaking and Listening and The Study of Spoken Language;
▶ participate in discussions, debates and interviews, for example in Speaking and Listening;

7.2 Thinking Skills and Personal Capabilities at Key Stage 4

Self-Management
Students should be able to:
▶ plan work, for example preparing extended pieces of writing;
▶ monitor, review and evaluate their progress and improve their learning, for example discussing teacher feedback from analysis of a text; and
▶ effectively manage their time, for example completing the examination tasks in Units 1 and 4.

Problem Solving
Students should be able to:
▶ reason, form opinions and justify their views, for example presenting and explaining the personal views of a character when studying written language;
▶ analyse critically and assess evidence to understand how information or evidence can be used to serve different purposes or agendas, for example, assessing the use of language in media texts;
▶ analyse and evaluate multiple perspectives, for example participating in debates in Speaking and Listening;
▶ weigh up options and justify decisions, for example reaching a collective decision in Speaking and Listening; and
▶ apply and evaluate a range of approaches to solve problems in familiar and novel contexts, for example coming to a conclusion in a discussion.

SQA Literacy National 4 / SQA Literacy National 5

Outcome 1
The learner will:
1 Read and understand straightforward word-based texts by:
1.1 Selecting and using relevant information

Outcome 2
The learner will:
2 Listen to and understand straightforward spoken communication by:
2.1 Selecting and using relevant information

Outcome 3
The learner will:
3 Write straightforward technically accurate texts by:
3.1 Organising ideas appropriately in writing
3.2 Selecting and using straightforward language including the use of appropriate spelling, grammar and punctuation

Outcome 4
The learner will:
Talk to communicate, as appropriate to audience and purpose, by:
4.1 Organising ideas appropriately in spoken communication
4.2 Communicating effectively through the selection and use of straightforward spoken language

ELIMINATION!
ACTIVITY

Introduction

Imagine working in a company with 100 times as many people as in your entire school. How would you know what everyone's up to or even what you're all aiming to make happen? How do you develop Sherlock-like powers of deduction?

What makes working at a large company so exciting is that there are usually lots of interesting projects going on and you get to work with lots of different people with a variety of experience and skills.

Your task

You're no doubt used to teachers organising classes and assigning rooms and study areas. But what happens in the workplace when you're on your own? Of course, you might be able to simply ask for help but if there's nobody around, what are the options?

This activity is a type of logic puzzle in which you need to work out the answers to a couple of questions by working through all the different options. This is a team challenge, and questioning and reasoning with others may help you get to the final answers more efficiently.

By solving this puzzle, you'll develop problem-solving skills that could help you in many aspects of work and everyday life. The following task will also be helpful when you take part in job interviews. Many companies (especially large ones) include verbal reasoning tests to select the best candidates.
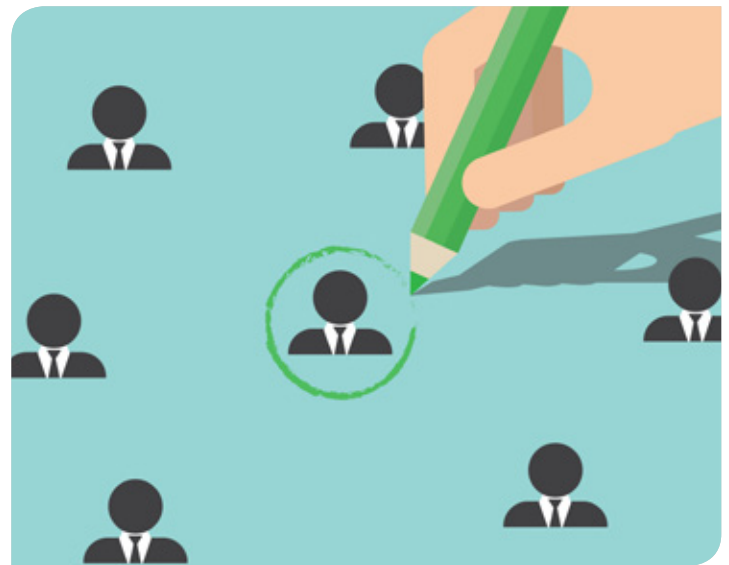
Everything you need to solve the puzzle is in the list of clues on the next page – you simply need to consider all of the options to eliminate the ones that aren't possible until you get the right answer.

You need to work with your team logically to complete the table in the **Student worksheet**, in order to answer the following two questions:

> ## Q. Which project room is Project Hawking based in?
> ## Q. Which project manager does Ali work for?

Find more science and maths activities at
www.jointhepod.org/hpcinspire

Here are your clues:

1	There are five major projects currently operating in EDF Energy
2	The Welsh project manager is based in the Hartlepool room
3	The Chinese project manager has the project analyst named Claire in the team
4	'Project Einstein' is based in the Hunterston room
5	The Russian project manager is in charge of 'Project Curie'
6	The Hunterston room is immediately to the right of the Heysham room
7	The analyst named Katy works on the project about thermodynamics
8	The project aimed at improving sustainability is based in the West Burton room
9	'Project Bohr' is managed in the middle project room
10	The Scottish project manager is based in the first room
11	The project about wind power is based in the room next to the project room that has an analyst named Jo
12	The sustainability project is based in a room next to the room where the analyst named Rich works
13	'Project Newton' is aimed at improving customer satisfaction
14	The French project manager is overseeing the project aimed at improving health and safety
15	The Scottish project manager's room is based next to the Dungeness room

Hints and tips

Each project has its own room, project manager (from a different country), project name, topic and analyst. Start by filling in the **Student worksheet** with the information above, to help you work towards the answers.

Try to work as a team, allowing everyone to have their say and to make their voice heard. You could ask one member of the team to play 'devil's advocate' (i.e. challenge everyone on their answers to test if they really are correct). It will help you to double check your thinking. If you do this at every stage, you should avoid having to go back and work things through again.

Each stage, you might want to challenge your chosen answers and ask:
▶ Is there any other answer to this question?
▶ Is it really true that … [insert possible scenario]?
▶ Could there be another answer?
▶ Is this answer actually possible?

In answering these challenges each time, you can sense check your deductions.

If you get stuck, ask your teacher for a clue card. Or ask them to challenge your answers. The key is to be flexible in your conclusions, questioning your accuracy each time.

Step 1

Start by working out the name of the first room by looking at the relevant clues (hint – look at clues 2, 4, 6, 8, 9, 10 and 15). What is the name of the project being run in this room?

Step 2

We know that Rich works in the second room, but what is he working on? This might take some guessing to get things started. For example, you could suppose that Rich is working on health and safety (he's definitely not on thermodynamics because we know Katy is concentrating on that). Then you can challenge this idea by checking it against that project's name, the nationality of the project manager etc. Eventually you will work through every option, discounting the guesses that don't fit the clues. When you've worked this out, you can use the same process to discover the nationality of Rich's project manager.

Step 3

Carry on filling in the grid by asking 'what if' questions, (eg 'what if Jo works in the Hunterston room?') Is this possible? Which clues suggest this could be possible? Do any make it impossible?

This is a task of persistence. Only by questioning the possibilities and eliminating those that are impossible will you get to the answer. Fill in the **Student worksheet** as you go – it might be best to use pencil, especially when making estimates. Good luck!

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	1	2	3	4	5
Room name					
Nationality of Project Manager					
Project name					
Project topic					
Project analyst					

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