~ THE SOLUTIONS ~

Devised and created by

Dr Tim Paulden

(TXP Quizmaster)

in association with

chalkdust — A magazine for the mathematically curious

Please get in touch if you have any queries or corrections!

Website: **www.TheXmasPuzzles.com**

Dedicated to the memory of
Robin Williams
(1987 – 2025)

A brilliant mathematician,
footballer, colleague, and friend

SPOTY: "Remembering the sports stars we lost in 2025"
https://www.bbc.co.uk/sport/articles/cn0ky511zk9o

Overview

The Quizmaster was delighted to receive almost 60 entries to **The Xmas Puzzles 2025** – a new record by a significant margin!

Details of this year's prize-winners (numbering 50 in total) appear on the next seven pages – with the new categories of *"Highly Commended: Gold"* and *"Commended: Silver"* being introduced to recognise the many excellent entries falling just outside the top four. Overall, the Quizmaster will be donating **£1,540** – a lovely mathematical number! – to the charities and good causes nominated by this year's prize-winners.

After these lists of prize-winners, some brief words from our winning entrants will be shared, followed by the full write-up of the solutions. For easy reference, this document will give the original text of each puzzle, followed by the solution.

Many thanks to everyone who participated in this year's contest, and congratulations to all our prize-winners!

The Xmas Puzzles 2025:
Our winning entrants

First place (£210 donation)

Liam Hughes and Oliver Church

Nominated charity: Medical Aid for Palestinians

Second place (£160 donation)

Benedict Howell

Nominated charity: The Brain Tumour Charity

Third place (£130 donation)

Andy Knott and Sam Knott

Nominated charity: Pathfinder Dogs, Wishaw

Fourth place (£100 donation)

David Yovichic

Nominated charity: Royal Marsden Cancer Charity

In light of the exceptional number of strong entries this year, additional charity donations have been awarded to entrants finishing in the top quarter (**"Highly Commended: Gold"** – extra £10) or in the top half (**"Commended: Silver"** – extra £5).

In the lists on the following pages, these bonuses have been combined with the charity donations awarded to entrants who successfully scored 50% or more (£10) and/or solved the overarching meta-puzzle (£5 for the initial meta-solution phrase; £10 for a full solution). The resulting donations therefore range across five levels: £30, £25, £20, £15, and £10.

Highly Commended: Gold

For entrants finishing in the top quarter

£30 to Animal Aid
(nominated by **Lior Gildar**)

£30 to The Big Issue
(nominated by **Alan Goddard**, **Ben Goddard**, **Charlotte Desvages**, and **Kryzi Fell**)

£30 to The Bridge Foundation
(nominated by **Annabelle Patel**, **Tony Green**, **Gordon Cameron**, **Marcus Gent**, and **Derek Pugh**)

£30 to Edinburgh Dog and Cat Home
(nominated by **Tom Barrett**, **Jake Barrett**, and **Jonathan White)**

£30 to Mercy Corps
(nominated by **Sam Peterson**, **Brian Decker**, and **Seth Kittle**)

£30 to Refugee Action York
(nominated by **Vincent Fish**)

£30 to RSPCA
(nominated by **Jeremy Horwitz**, **Paul Melamud**, **Dan Miller**, **Corey Plover**, and **Charles Steinhardt**)

£30 to Swan Support
(nominated by **Jonathan Wells**)

£30 to Viva [viva.org.uk]
(nominated by **Andrea Chlebikova** and **Oscar Gillespie**)

£30 to World Wildlife Fund
(nominated by **Kishore Rajesh**)

Commended: Silver

For entrants finishing in the top half

£25 to Alzheimer's Research UK
(nominated by **Andrew Lawson**)

£25 to The Brain Tumour Charity
(nominated by **Mary Ann Collins Monteiro** and **Dave Monteiro**)

£25 to Child Rights International Network
(nominated by **Team Big Load** – **Susanne Kerndle**, **Peter Treitler**, **Stephan Lendl**, **Nicholas Martin**, and **Thomas Doppelreiter**)

£25 to The Friary [the-friary.org.uk]
(nominated by **Becky Russell**)

£25 to The Greyhound Trust UK
(nominated by **Michael Mazur** and **Jon Mazur**)

£25 to The Internet Archive
(nominated by **Sanja Miklin** and **Rhys Povey**)

£25 to Shelter
(nominated by **James Taverner** and **Mattias Andersson**)

£25 to The Wikimedia Foundation
(nominated by **The Gavin Family** – **David**, **Helen**, **Chris**, **Tom**, and **Matthew**)

£20 to Médecins Sans Frontières UK
(nominated by **Ian Preston** and **Candadi Sukumar**)

£20 to Mind
(nominated by **Jim Myers**)

£20 to Parkinson's UK
(nominated by **Bob De Caux**)

Commended: Silver (continued)

£20 to Oppia Foundation [oppia.org]
(nominated by **Sean Lip**)

£20 to St Catherine's Hospice [stcatherines.co.uk]
(nominated by **Rosie Barron** and **Gerad Carter**)

£20 to The Trussell Trust
(nominated by **Isabel Wiltshire**, **Simon Wiltshire**,
and **Victoria Hussey**)

£20 to Unique Kidz & Co [uniquekidzandco.org.uk]
(nominated by **Ryan Read-Potter**, **Lydia Read-Potter**,
Andy Currington, and **Tomack Gilmore**)

Other prize-winners

For entrants scoring 50%+ and/or solving the meta-puzzle

£15 to Cancer Research UK
(nominated by **David Blacknell**)

£15 to Cardiomyopathy UK
(nominated by **Marc Wiseman**)

£15 to Dame Alice Owen's Foundation
(nominated by **Nadia Sidorova**)

£15 to Deaf Choices UK
(nominated by **Andrew Garratt**)

£15 to Doctors Without Borders
(nominated by **Jon Foster** and **Ben Reiniger**)

£15 to GiveWell
(nominated by **Team Salute** – **William Chen**, **Yuyin Li**, and **Yao Yu**)

£15 to Go Beyond [gobeyond.org.uk]
(nominated by **Casey Long**)

£15 to Guide Dogs [guidedogs.org.uk]
(nominated by **Abi Williams** and **Ellen Williams**)

£15 to Maths World UK
(nominated by the **Threads and Tangents** team)

£15 to PSPA
(nominated by **Daniel Fearnhead**, **Ben Fearnhead**, **Rebekah Fearnhead**, **Elizabeth Fearnhead**, and **Paul Fearnhead**)

£15 to RSPCA
(nominated by **Mark Payton**, **Gordon Emslie**, **Merrall Price**, and **MacKenzie Payton**)

Other prize-winners (continued)

£15 to St Basils [stbasils.org.uk]
(nominated by the **Groombridge/Theodorou family** – **Kathryn Groombridge**, **David Groombridge**, **Ruth Groombridge**, **Mim Groombridge**, and **Pav Theodorou**)

£15 to St Columba's Hospice Care
(nominated by the **Scottish Scrabblers** – **Chris Cummins**, **Simon Gillam**, and **Ross Mackenzie**)

£15 to The Trussell Trust
(nominated by **Paul Taylor**, **Mark Taylor**, and **Katie Steckles**)

£15 to WaterAid
(nominated by **Alec Erskine**)

£15 to the West Lancashire Crisis and Information Centre
(nominated by the **Quarantine Decrypters** – **Chasemad5**, **cp80**, **radarvillage**, **rikimaruyyds**, and **Brillig**)

£15 to Welsh Corgi Rescue [welshcorgirescue.co.uk]
(nominated by **Szymon Sawicki**)

£15 to World Central Kitchen
(nominated by **Heidi Kirsch**)

£10 to Cancer Research UK
(nominated by **Damien Kerr** and **Paul Tagg**)

£10 to The Motor Neurone Disease Association
(nominated by **David Harris**)

£10 to Neuroendocrine Cancer UK
(nominated by **Ian Caulfield** and **Diana Caulfield**)

Before finally unwrapping the solutions, we wanted to once again embrace the spirit of *making connections*, and share a few words from our winning entrants.

Liam Hughes and Oliver Church (1st place) write: "We are delighted to have achieved first place in what has proven to be another intriguing set of puzzles from Dr Tim Paulden. We particularly enjoyed learning about the rotund bovine of some renown in Puzzle 2 ("Taylor Series"). We were also amused to spot a mathematical idea in Puzzle 12 ("… A.P.T. (2025)") that we recognised from a Matt Parker video we had seen a few months earlier – it was fun to encounter it in a new setting. Thanks to Tim for his great work setting these puzzles."

Benedict Howell (2nd place) writes: "As usual, this year's quiz was a delight to solve, with its combination of statistical brainteasers, festive themes, and detailed interconnections between puzzles. The addition of the meta-puzzle provided an extra layer of fun and intrigue, and also provided some reassurance for a couple of solutions where I began to doubt myself – I'm looking at you, Puzzle 6. Personal favourite puzzles included "The One and Only" (for the second-derivative solutions), "Running Up That Hill" (for the fantastically thematic title and graphics), "Circle of Life" (where the amount of detail crammed into the short preamble provided many beautiful connections), and "… A.P.T. (2025)" (a perfect mixture of mathematical puzzling and related research, with an apt "a-ha!" moment for the Partridge links). My immense thanks to Tim for providing not only a wonderful quiz, but also very generous charitable donations to a variety of good causes."

Andy Knott and Sam Knott (3rd place) write: "Like previous Christmas puzzle sets, we found this year's collection to be another very enjoyable set of challenges to get stuck into, covering a wide range of subjects. We particularly liked the puzzles for which we needed to delve deep into new areas, such as Hill ciphers in Puzzle 9 ("Running Up That Hill") and Conway's Game of Life in Puzzle 10 ("Circle of Life"). Not being that familiar with Run-DMC's works, we found the penny-drop moment for Puzzle 7 very satisfying. We were also impressed with how the Puzzle 1 questions had been set to result in their specific answers – not an easy

feat. Enormous thanks to the puzzle setters and congratulations to all the prize-winners."

David Yovichic (4th place) writes: "A big thank you for what was a highly entertaining (but extremely challenging) set of puzzles; it must take even longer to devise the quiz than it does to try and solve it! Lots of great questions – "Circle of Life" was a brilliantly structured puzzle; cracking the code on "Running Up That Hill" felt like a Herculean achievement; and as someone old enough to remember the 80s, it was great to see Run-DMC, *Die Hard* and *Hi-de-Hi!* all put in an appearance. The best thing, though, was the knowledge gained along the way – like all the best quizzes, you come out of it as pleased with the new things that you have learned as with the questions you were able to answer. Congratulations to both the puzzle setters and the winners!"

List of puzzles

Total points available: 100

Meta-puzzle [6 points]

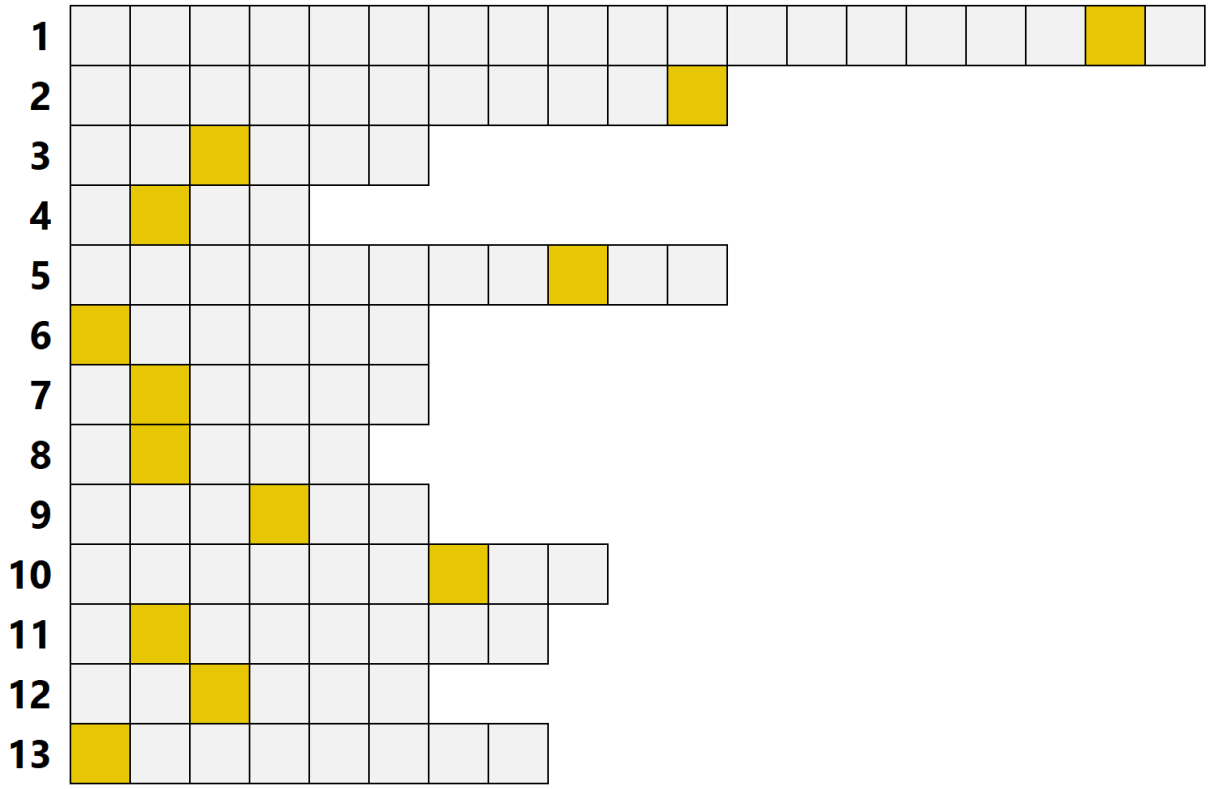
This meta-puzzle has been placed at the beginning for visibility.

Write your solutions to the thirteen puzzles into the grid below, then anagram the thirteen gold letters to obtain the meta-solution.

This meta-solution features briefly, in its traditional form, in one of the solutions – which one? (Its less-traditional form shares a cosy connection with another solution – which one?)

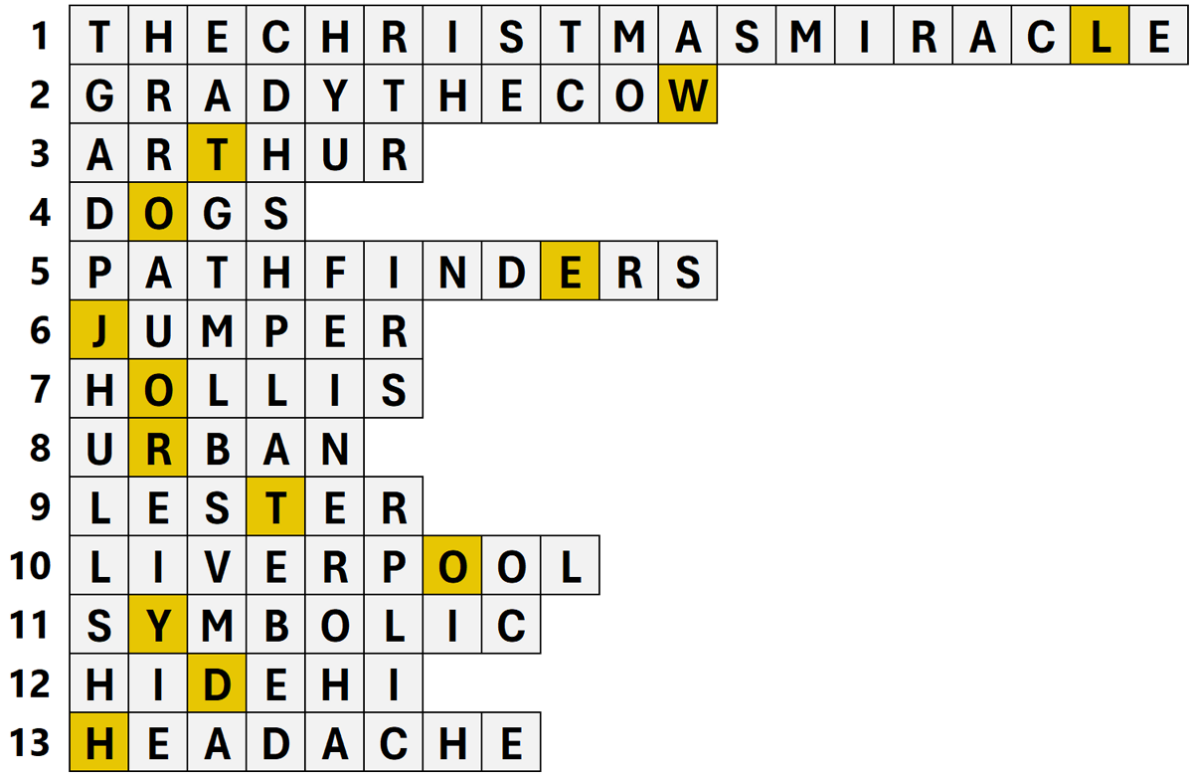
If the meta-solution is interpreted as a film, what location name does it share (unfortunately) with a horror film starring an actor whose surname appears in the grid?

Finally, which four solutions can be combined to create an appropriate name for this year's competition?



META-PUZZLE SOLUTION

Solvers needed to fill in the grid with the answers from the thirteen individual puzzles, as shown below:



Reading off the thirteen letters in the gold squares (one from each row) yields the string LWTOEJORTOYDH, and anagramming these letters reveals the meta-solution: **JOY TO THE WORLD**.

The puzzle then asks four follow-up questions regarding this phrase:

1) Traditional form: The traditional Christmas carol ***Joy to the World*** is sampled briefly in the **Run-DMC song *Christmas in Hollis*** (see here), and therefore features in **HOLLIS** – the solution to Puzzle 7. (The carol also appears – though not so *"briefly"* – on the album *Arthur's Perfect Christmas* (see here), linking to ARTHUR (Puzzle 3).)

2) Less-traditional form: The "less-traditional" version being referenced is the 1971 hit song *Joy to the World* by the band **Three Dog Night** (see here), which shares a *"cosy connection"* with the solution to **Puzzle 4 (DOGS)** via the band's name – the phrase "Three Dog Night" is said to originate from an indigenous Australian expression describing a night so cold that one needs to **cosy up with three dogs to stay warm** (see here). (Solvers who interpreted the song's opening lyric, *"Jeremiah was a bullfrog"*, as referencing a JUMPER (Puzzle 6) were also awarded the point.)

3) Film, location, and actor: Interpreting *Joy to the World* as a film points to the 2025 holiday movie of that name, in which the main character lives on **GOOSE LANE** (see here) – and unfortunately, Goose Lane is also the setting of a grisly murder in the 1935 horror classic ***Werewolf of London*** (see here). The star of *Werewolf of London* is **Henry Hull** (see here), and his surname, **HULL**, appears in the grid as a vertical acrostic formed by the first letters of solutions 7, 8, 9, and 10 (**HOLLIS, URBAN, LESTER, LIVERPOOL**). Additionally, some solvers noted that the film features Lester Matthews (full name **Arthur Lester Matthews** – see here), linking back to ARTHUR (Puzzle 3) and LESTER (Puzzle 9).

4) Finding the "appropriate name": Combining the same four consecutive solutions that form the "HULL" acrostic gives the name **HOLLIS URBAN LESTER LIVERPOOL**. This is the real name of the famous Trinidad and Tobago calypsonian better known as **CHALKDUST** (see here) – a highly appropriate name for this year's competition, as *The Xmas Puzzles 2025* was produced in association with ***Chalkdust*** **magazine**. Furthermore, in a lovely coincidence, the musician adopted the name "Chalkdust" after stumbling across **a publication with that name** (see here):

Contrary to popular belief, I did not adopt the sobriquet "Chalkdust" because I was a teacher-in-training. No. One day, I walked by Lumen Book Store in Port of Spain and I espied quite a few books that were being discarded. Being an avid reader, I stopped to salvage whatever interested me and I happened upon a book by the name of "Chalkdust". That sounded bells in me and so, I adopted the name. Earlier, I was known as "The Philosopher".

It's also notable that the musician Chalkdust refers to his calypsos as "academic papers" (see here), and is a recipient of the appropriately festive-sounding ***Prince Claus Award*** (see here).

In terms of additional connections and observations:

- A couple of solvers made the wonderful observation that *The Church in the Province of the West Indies (C.P.W.I.)* – which includes Chalkdust's home nation of Trinidad and Tobago – lists *Joy to the World* as hymn number 73 in its hymnal (see here), echoing the special number S=73 featuring across the puzzle set (see Puzzle 2 / Puzzle 13).
- Several solvers also noted a musical thread running through a number of the puzzle titles and themes, including the following works: *The One and Only* by Chesney Hawkes, *22* (and many others) by Taylor Swift, *Modern Art* by Art Brut, *Doot Doot (6 7)* by Skrilla, *Christmas in Hollis* by Run-DMC, *Running Up That Hill* by Kate Bush, *Circle of Life* by Elton John, *Even in Arcadia* by Sleep Token, *APT.* by ROSÉ & Bruno Mars, and *Written in the Stars* by Tinie Tempah.

Puzzle 1: THE ONE AND ONLY [12 points]

(The solution has 19 letters.)

Identify the items below. What feature do all nineteen of them share, and together what do they reveal?

(Note: The bracketed numbers are the lengths of the words in each item.)

(a) Iconic event venue located 800m from the White House [6,1,6,10]
(b) Finnish designer of a 1980s film poster that looks older, with the letters F, A, I, and B appearing in orange [5,8]
(c) Physicist, psychologist, and psychical researcher who specialised in colour perception, and gave his name to a unit [7,1,7]
(d) Illuminating landmark commonly known as "Bug Light" [6,4,5,3,5]
(e) Beloved 1915 playhouse whose logo features two intertwined letters and two golden masks [2,8,7]
(f) Widely panned 2012 Australian reality show [5,4,6]
(g) Writer of a poem whose title has the initial letters DITMAPITF [8,5]
(h) Place where Shearer and Rodney both won in February 2025 [7,10]
(i) European Athletics Championships silver medallist whose surname sounds festive [5,12]
(j) Subset comprising numbers 6, 32, 38, 51, 102, 130, and 143 [11,6]
(k) Name shared by educational establishments in Donnington, Taunton, and Thornbury [3,6,6]
(l) Nigerian film starring GN as V and OE as I [4,2,9]
(m) Saxophonist and producer who contributed to *Let's Stay Together*, *Son of a Preacher Man*, *Respect*, and *Mustang Sally* [7,8]
(n) Cold, hard title of the 73rd and final episode [3,4,6]
(o) Austin Roberts song whose lyrics mention a clown [10,5,4,2]
(p) Minister who stated back in September that Spain should withdraw from Eurovision 2026 if Israel participates [6,7]
(q) The maxim of all and none [6,2,4,2,5]
(r) Name of the tournament that last took place in Delaware in 1993, or in Italy in 1999 [9,12]
(s) Actor appearing in both *Santa with Muscles* and *Mrs Doubtfire* [7,6]

PUZZLE 1 SOLUTION

Puzzle 1 challenges solvers to identify the nineteen items based on the clues provided. As hinted by the title, *THE ONE AND ONLY*, each item has the structural property that **its constituent letters each appear exactly twice, except for one letter that appears only once** – for instance, ANDREW W MELLON AUDITORIUM = 2×{A,D,E,I,L,M,N,O,R,U,W} + {T}. (It is tacitly assumed that capitalisation and punctuation should be ignored.)

Solvers should have identified the following items, along with the "one and only" letter in each case:

Clue	Item	"One and only" letter
(a)	**ANDREW W MELLON AUDITORIUM**	**T**
(b)	**ERKKI RUUHINEN**	**H**
(c)	**LEONARD T TROLAND**	**E**
(d)	**ORIENT LONG BEACH BAR LIGHT**	**C**
(e)	**AL RINGLING THEATRE**	**H**
(f)	**BEING LARA BINGLE**	**R**
(g)	**MARIANNE MOORE**	**I**
(h)	**TAUNTON RACECOURSE**	**S**
(i)	**EELCO SINTNICOLAAS**	**T**
(j)	**PENITENTIAL PSALMS**	**M**
(k)	**THE CASTLE SCHOOL**	**A**
(l)	**ROAD TO YESTERDAY**	**S**
(m)	**CHARLES CHALMERS**	**M**
(n)	**THE IRON THRONE**	**I**
(o)	**SOMETHING'S WRONG WITH ME**	**R**
(p)	**ERNEST URTASUN**	**A**
(q)	**DICTUM DE OMNI ET NULLO**	**C**
(r)	**MCDONALD'S CHAMPIONSHIP**	**L**
(s)	**WILLIAM NEWMAN**	**E**

Some notes on specific clues:

- Item (b): The referenced poster was produced for the film *Fanny and Alexander* (see here).
- Item (g): The poem referenced as "DITMAPITF" is *Diligence Is To Magic As Progress Is To Flight* by Marianne Moore (see here).
- Item (h): "Shearer" and "Rodney" are racehorses who won at Taunton Racecourse in February 2025 (see here and here).

- Item (i): The surname of Dutch athlete Eelco Sintnicolaas is a festive nod to Sint Nicolaas, i.e. Saint Nicholas / Santa (see here).
- Item (l): The two actors mentioned in the clue are Genevieve Nnaji as Victoria, and Oris Erhuero as Izu (see here).
- Item (n): *The Iron Throne* is the title of the 73rd and final episode of *Game of Thrones* (see here).

Reading the extracted letters reveals the solution: **THE CHRISTMAS MIRACLE**.

Appropriately, **this solution phrase also follows the "one and only" rule, with a single letter L left over** (i.e. THE CHRISTMAS MIRACLE = 2×{A,C,E,H,I,M,R,S,T} + {L}), and **it is this L that serves as the highlighted letter when THE CHRISTMAS MIRACLE appears in the meta-puzzle grid**. (Some solvers described this "leftover L" as being a "second derivative" or "meta-step".)

Finally, given the "one and only" theme underlying the puzzle, it is appropriate that it appears as **puzzle number one** in the collection.

In terms of additional connections and observations:

- Some solvers deduced the "one and only" structural property after observing that every one of the nineteen items contains an odd number of letters.
- The "73rd and final episode" mentioned in clue (n) is the first instance of the special number S=73, which is introduced subsequently in Puzzle 2 – see the solutions for Puzzle 2 and Puzzle 13 for details.
- The solution, THE CHRISTMAS MIRACLE, was widely interpreted as a reference to the Nativity, with Jesus as God's "one and only" son.
- Some solvers drew a link between the leftover L contributing to the meta-puzzle and the phrase *"gets the L"* from the text of Puzzle 6, while others noted the wordplay that L + ONE = LONE (a synonym for "only" or "left out").
- Several solvers linked the puzzle title to the 1991 pop song *The One and Only* by Chesney Hawkes (written by Nik Kershaw), with a few making the delightful observation that the combination phrase "HAWKES / KERSHAW" also obeys the puzzle's rule – i.e. it consists of exact pairs of letters plus a single extra R.
- Finally, the appearance of *Mrs Doubtfire* in clue 1(s) was recognised by a few solvers as a nod to the name "Robin Williams" – the mathematician and England footballer to whom *The Xmas Puzzles 2025* was dedicated (as shown on page 2).

Puzzle 2: TAYLOR SERIES [5 points]

(The solution has 11 letters.)

Identify the creator of the items that contain the snippets below, which are all numerical in nature. What eleven-letter name – a creature who was also *"raised on a farm"* – do they encode? *(Note: This name is the answer contributed to the meta-puzzle.)*

What special date arose exactly *S* years after the famous incident involving this creature (where *S* is an integer appearing several times – both directly and indirectly – within these puzzles)? And which Grammy-winning actress – who, in 2023, celebrated beating the above creator *"for 10 minutes"* – might have enjoyed one of the creator's numerical works on this special date?

... ate___ bars ...

... since___ hours ...

... this___ ends ...

... next___ years ...

... photos___ cents ...

... you___ seconds ...

... last___ months ...

... I'm___ years ...

... hand___ times ...

... but___ seconds ...

... still___ inside ...

PUZZLE 2 SOLUTION

The puzzle title – *TAYLOR SERIES* – is a mathematical pun: rather than referring to an infinite sum of terms, as in the standard mathematical usage (see here), it instead points to a *series of lyrics* by singer-songwriter **Taylor Swift**, who is the *"creator"* referenced in the text.

Each snippet in the puzzle is a line from a Taylor Swift song with a specific number removed. Solvers needed to identify the missing number in each line (using, for example, the lyrics database here) and convert it to a letter using the standard A1Z26 cipher (A=1, B=2, …, Z=26):

Song	Snippet	Number	Letter
The Tortured Poets Department	**… ate [7] bars …**	**7**	**G**
Everything Has Changed	**… since [18] hours …**	**18**	**R**
Blank Space	**… this [1] ends …**	**1**	**A**
Fifteen	**… next [4] years …**	**4**	**D**
Timeless	**… photos [25] cents …**	**25**	**Y**
Lover	**… you [20] seconds …**	**20**	**T**
Begin Again	**… last [8] months …**	**8**	**H**
The Best Day	**… I'm [5] years …**	**5**	**E**
New Year's Day	**… hand [3] times …**	**3**	**C**
Question…?	**… but [15] seconds …**	**15**	**O**
right where you left me	**… still [23] inside …**	**23**	**W**

The resulting letters in the final column spell out the solution: **GRADY THE COW**.

Grady the Cow was a famous bovine from Yukon, Oklahoma, who made headlines in 1949 after **jumping into a silo and becoming stuck** (see here). The puzzle text mentions that this creature was '**also "*raised on a farm*"**', with the word "also" here referring to **Taylor Swift**, who famously (and festively) grew up on a **Christmas tree farm** – the words *"raised on a farm"* appear in the lyrics of *I Bet You Think About Me (Taylor's Version)* (see here) and her childhood memories of Christmas feature in the song *Christmas Tree Farm* (see here).

Grady's *"famous incident"* in the silo occurred on **22 February 1949**, and the puzzle asks for a special date exactly **S** years later, where S appears several times within the puzzle set. The value of S turns out to be **73** (with full details appearing in the Puzzle 13 write-up), and **adding 73 years on to 22 February 1949** gives **22 February 2022**. This special date was widely celebrated as **"Twosday"** because it fell on a Tuesday and was **composed entirely of 2s** (or 2s and 0s), as well as being a

palindrome, whether expressed as 22/2/22 or 22/02/2022 (see here). Numerous solvers also noted the pop-culture status of **S=73** as the **"Sheldon Prime"** from *The Big Bang Theory* (see here), which was indeed why the **letter "S"** was chosen (see Puzzle 13 for further discussion).

Finally, the Grammy-winning actress is **Celia Rose Gooding** (see here), who **won a Grammy for *Jagged Little Pill***. In 2023, Gooding celebrated that the soundtrack for the ***Star Trek: Strange New Worlds*** musical episode (see here) briefly topped the charts, joking in an interview: **"We beat Taylor Swift for 10 minutes!"** (see here). Gooding, who was born on **22 February 2000**, turned **exactly 22 on Twosday (22 February 2022)**, and so might well have enjoyed listening to Taylor Swift's numerically titled ***22*** (see here) to mark the occasion. As many solvers noted, it is also apt that a puzzle featuring so many 2s is **puzzle number 2** in the collection.

A couple of solvers also spotted the numerical flourish that **dividing 22022022 (Twosday's date) by 22 (Taylor Swift's "numerical work") gives 1001001 – or 73 in binary –** which is **palindromic** (as per Sheldon's famous description), **just like Twosday's date itself.**

Many solvers also enjoyed discovering that the farming expert who eventually rescued Grady from the silo was named **Ralph Partridge** (see here), providing a festive link to the theme of Puzzle 12 (and part of Puzzle 4).

Finally, in a delightful coincidence not mentioned by solvers, the cover of the November 2025 edition of *Chalkdust* magazine includes the text ***"More tracks than Taylor Swift"*** (see here) – and the issue number just so happens to be **22**.

In terms of additional connections and observations:

- The wonderful musical episode of *Star Trek: Strange New Worlds* referenced by Celia Rose Gooding has an appropriately mathematical name: *Subspace Rhapsody* (see here).
- Several solvers noted that Taylor Swift's appearance in *Vogue*'s "73 Questions" series (see here) provides a further link to the number 73.
- A few solvers highlighted a possible (though unintended) echo of "Tyler, the Creator" (see here) in the puzzle text's reference to *"the creator"*, given the similarity between "Tyler" and "Taylor".

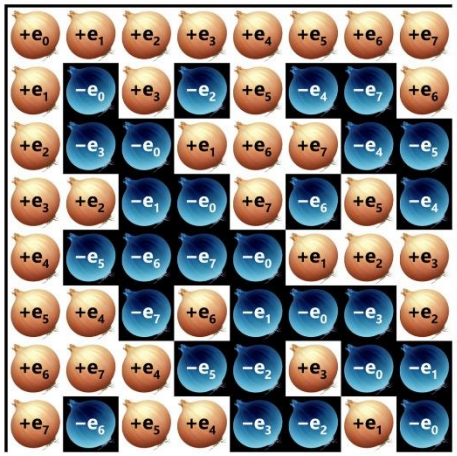
Puzzle 3: MODERN ART [9 points]

(The solution has 6 letters.)

What name connects the nine images in the gallery shown on the next page? (In each case, the connection should be identified.)

Which animal is widely regarded as the origin of this name, and whereabouts does one appear within this document?

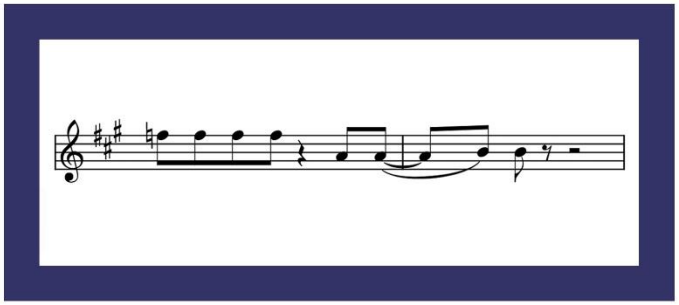
Finally, which individual referenced in one of the images now runs a real-life art gallery, and why might they feel a connection (albeit in reverse) with the final sentence of Puzzle 2?


+e0 +e1 +e2 +e3 +e4 +e5 +e6 +e7
+e1 −e0 +e3 −e2 +e5 −e4 −e7 +e6
+e2 −e3 −e0 +e1 +e6 +e7 −e4 −e5
+e3 +e2 −e1 −e0 +e7 −e6 +e5 −e4
+e4 −e5 −e6 −e7 −e0 +e1 +e2 +e3
+e5 +e4 −e7 +e6 −e1 −e0 −e3 +e2
+e6 +e7 +e4 −e5 −e2 +e3 −e0 −e1
+e7 −e6 +e5 +e4 −e3 −e2 +e1 −e0

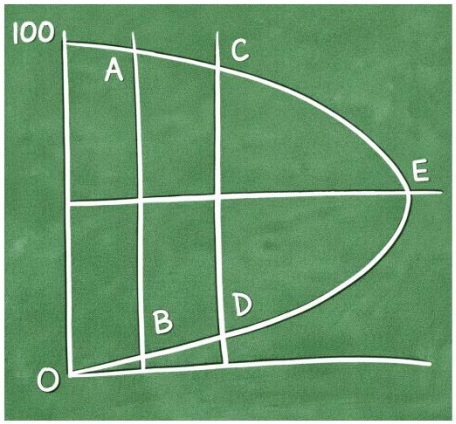

WA16 6RZ


2020 N.S.
2021 L.J.M.
2022 H.J.G.
2023 N.B.
2024 M.M.
2025 S.G.


UNDER THE TREE!




(TSO)
(RDC)
(JSC)


100
A
C
E
B
D
O


IIIASOUPFTCOC
KOTBDOTSSOAE

PUZZLE 3 SOLUTION

A special puzzle to mark the birth of Arthur Bertie Paulden in September 2025 – see the Google search link here to view the announcement in The Times.

The nine images are all connected by the name **ARTHUR** – and several solvers recognised this as being a dedication to the **Quizmaster's new son (and third child), Arthur**, following in the footsteps of previous "Evelyn" and "Esther" puzzles in 2021 and 2023. The puzzle title, ***MODERN ART***, provides a clue to this new arrival, with "modern" being indicative of "new" and "Art" being an abbreviation of "Arthur" – and of course, the **puzzle number** couldn't be anything other than **number 3**.

Reading left-to-right, from the top row to the bottom row, the connections for the nine images are as follows:

Arthur Cayley: The image shows an octonion multiplication table (specifically for basis elements e_0 to e_7), with onions representing the elements to create a visual pun on "oct-onions". Octonions are also known as "Cayley numbers", after the mathematician Arthur Cayley (see here), though several entrants noted the independent work of John T. Graves.

Arthur Shelby Jr: The postcode WA16 6RZ is closely linked to Arthur Shelby Jr from the TV series *Peaky Blinders*, as it is the filming location for his home, Hawthorn Bank (see here and here). The typography mimics the *Peaky Blinders* title cards.

Arthur C. Clarke: The years and initials correspond to recent winners of the Arthur C. Clarke Award for science fiction (see here): 2020 = N.S. (Namwali Serpell, *The Old Drift*); 2021 = L.J.M. (Laura Jean McKay, *The Animals in That Country*); 2022 = H.J.G. (Harry Josephine Giles, *Deep Wheel Orcadia*); 2023 = N.B. (Ned Beauman, *Venomous Lumpsucker*); 2024 = M.M. (Martin MacInnes, *In Ascension*); 2025 = S.G. (Sierra Greer, *Annie Bot*).

Arthur Christmas / **Arthur Claus**: A still from the animated film *Arthur Christmas*, depicting the note reading "UNDER THE TREE!" which Arthur delivers along with the final present (see the video here, at around the 3m27s mark).

Arthur's Theme / **Arthur Bach**: The sheet music shows the verse melody from *Arthur's Theme (Best That You Can Do)* by Christopher Cross, which features in the film *Arthur* (with some solvers also referencing the character, Arthur Bach). The words accompanying this melody in verse 2 are – somewhat appropriately – *"Arthur, he does what he pleases…."* (see here).

Arthur Ashe: The three trophies represent Arthur Ashe's three Grand Slam singles titles: the US Open in 1968, the Australian Open in 1970, and Wimbledon in 1975 (see here). The initials underneath are the defeated finalists: TSO = Thomas Samuel

Okker (Tom Okker); RDC = Richard D. Crealy (Dick Crealy); JSC = James Scott Connors (Jimmy Connors).

Arthur Laffer: A diagram of the Laffer curve, named after economist Arthur Laffer (see here).

Arthur Conan Doyle: An illustration that appeared alongside Arthur Conan Doyle's short story *An Exciting Christmas Eve; or, My Lecture on Dynamite* when it was published in *Every Boy's Monthly* in 1905 (see here).

King Arthur: The letters represent the initials of King Arthur's quote from *Monty Python and the Holy Grail*: "It Is I, Arthur, Son Of Uther Pendragon, From The Castle Of Camelot. King Of The Britons, Defeater Of The Saxons, Sovereign Of All England!" (see here).

The animal often regarded as the origin of the name "Arthur" is the **BEAR** (see here), derived from the Welsh "Arth" or Celtic "Artos". A teddy bear is visible inside the **smallest bauble on the front page of the puzzle set,** symbolising the Quizmaster's new arrival, with the two larger baubles representing Arthur's older sisters in a similar manner: Evelyn (derived from "little bird") and Esther (derived from "star"), as per the 2021 and 2023 puzzle sets.

Turning to the final paragraph of the puzzle, the individual referenced in one of the images who now runs a real-life art gallery is **TOM OKKER** (the tennis player "TSO" beneath the first trophy in image 6), who runs the Tom Okker Art gallery in the Netherlands (see here). He would feel a connection to the final sentence of Puzzle 2 (which references Celia Rose Gooding celebrating her 22nd birthday on 22/2/22) because **he was also born on 22 February, back in the year 1944**. The connection is **"in reverse"** because while Celia Rose Gooding was born exactly 22 years before 22/2/22, **Tom Okker was born exactly 22 years after the previous 22/2/22 - namely, 22 February 1922.** (Some solvers neatly framed this idea as Tom Okker being "negative 22 years old" on 22 February 1922.) Echoing this numerical theme, a few solvers spotted that the film *Arthur Christmas* illustrated in image 4 was released in the UK on 11 November 2011 – or 11/11/11 (see here).

Finally, several solvers noted that the Andrew W. Mellon Auditorium (Puzzle 1, item a) was designed by **Arthur Brown Jr** (see here), and the actor William Newman (Puzzle 1, item s) once guest-starred on *Picket Fences* as a character named **Arthur** (see here). In fact, **several other "Arthurs" are dotted throughout the rest of the puzzle set**, including in Puzzle 5 (Arthur Dent, Arthur "Bomber" Harris), Puzzle 9 (Arthur White, Arthur Rankin Jr, *Uncle Arthur*), and the meta-puzzle (Arthur Lester Matthews).

In terms of additional connections and observations:

- Puzzles 1 to 3 all contain a connection to births or birthdays: Puzzle 1 features *"The Christmas Miracle"* (Jesus's birth), Puzzle 2 features a 22nd birthday landing exactly on Twosday, and Puzzle 3 is dedicated to the birth of the Quizmaster's son, Arthur.
- A handful of solvers noted that Arthur Cayley died at the age of 73 (see here) – the special number "S" introduced in Puzzle 2 – and Tom Okker won the French Open Doubles title in 1973.
- Others highlighted that "NuMex Arthur" is a variety of onion (see here), offering a further layer to the "oct-onions" pun in the first image.
- The postcode in the second image (WA16 6RZ) also encompasses St Mary's Church in Rostherne, some parts of which were designed by Arthur Blomfield (see here).
- Some solvers highlighted that Tom Okker turned 78 years old on Twosday in 2022, and that 78 is the *"reverse"* (as per the text) of 87 – a significant number for Taylor Swift, as it is the jersey number of her fiancé Travis Kelce (see here) and one of the ages mentioned towards the end of her track *Mary's Song – "I'll be 87; you'll be 89"* (see here). Incidentally, Taylor Swift's own lucky number is 13, which (somewhat conveniently) combines with Kelce's 87 to make 100, as per her 2025 statement: *"Literally it's that simple: 13 plus 87 equals 100"* (see here). Of course, the number 13 also matches the number of puzzles in this year's puzzle set.

Puzzle 4: PBQGKGIWPF [6 points]

By Matthew Scroggs and Tim Paulden

(The solution has 4 letters.)

RCDQ:

- GCHFE BR KIDEI'K DCDG WGCDQGGW
- RCYG ZBWQK RWBU EFG KCL-ZBWQ ECETG BR I XS PFWCKEUIK DXUOGW BDG
- EZB BR EFG EFWGG ZCKG UGD'K HCREK
- GTGYGD HCREK RWBU EFG EZGTYG QIMK BR PFWCKEUIK

A	T	K	F	G	D	K	X	K	Q	W	B	T
L	I	Q	F	E	I	R	J	C	J	G	W	K
J	Q	C	J	J	I	W	E	W	C	Q	H	G
B	C	I	T	K	G	I	I	E	H	F	G	R
E	G	U	B	P	C	D	Q	F	W	W	M	U
F	K	W	Q	K	P	S	E	I	I	T	G	E
G	E	G	X	G	Y	C	L	G	D	W	K	B
W	R	E	W	F	G	D	U	C	Q	P	W	O
G	V	X	C	E	G	P	P	K	U	K	G	C
K	K	C	T	C	S	G	D	X	I	H	F	W
O	T	C	E	N	G	D	H	Z	J	D	K	Q
B	W	Q	D	B	G	K	G	G	H	C	I	K
Q	B	Y	G	K	W	G	U	U	X	W	Q	K

PUZZLE 4 SOLUTION

In this puzzle, all of the text has been encrypted using a **monoalphabetic substitution cipher**, with the title *PBQGKGIWPF* decrypting to **CODESEARCH** (i.e. a wordsearch in which the letters have been encoded). Many solvers described how they gradually deduced the form of the cipher mapping through frequency analysis or pattern matching (for instance, spotting that the pattern *"KIDEI'K"* corresponds to "SANTA'S", or that *"WGCDQGGW"* corresponds to "REINDEER").

The cipher employs a simple variation on a "keyword mixed" approach, with the key phrase **JOIN THE GAPS** appearing first, followed by XYZ (placed early to ensure that no letter maps to itself), and then the remaining letters in alphabetical order. In other words, the decryption mapping has the following structure (formatted below as two tables – A to M, then N to Z – for convenience of presentation):

Cipher	A	B	C	D	E	F	G	H	I	J	K	L	M
Plain	J	O	I	N	T	H	E	G	A	P	S	X	Y

Cipher	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Plain	Z	B	C	D	F	K	L	M	Q	R	U	V	W

After decryption, the message shown above the grid reads as follows:

FIND:

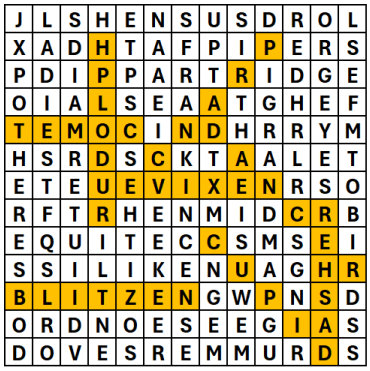
- EIGHT OF SANTA'S NINE REINDEER
- FIVE WORDS FROM THE SIX-WORD TITLE OF A UK CHRISTMAS NUMBER ONE
- TWO OF THE THREE WISE MEN'S GIFTS
- ELEVEN GIFTS FROM THE TWELVE DAYS OF CHRISTMAS

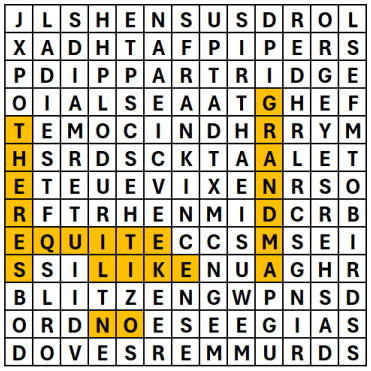
Solvers then needed to decode the letter grid using the same cipher before starting the wordsearch – and as per the message above the grid, exactly one item is missing from each group:

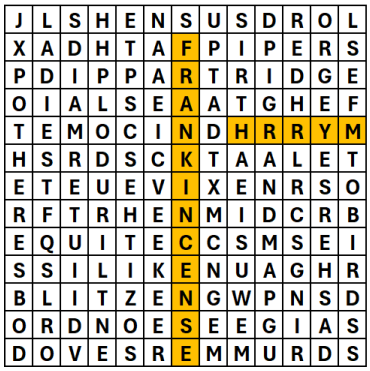
1. **Reindeer:** The grid contains DASHER, DANCER, PRANCER, VIXEN, COMET, CUPID, BLITZEN, and RUDOLPH, so the missing reindeer is **DONNER**.
2. **UK Christmas Number One:** The song in question is the 1980 UK Christmas Number One, ***There's No One Quite Like Grandma*** by St Winifred's School Choir (see here). The grid contains THERE'S (without an apostrophe, of course), NO, QUITE, LIKE, and GRANDMA, so the missing word is **ONE**.
3. **Three Wise Men's Gifts:** The grid contains FRANKINCENSE and MYRRH, so the missing gift is **GOLD**.

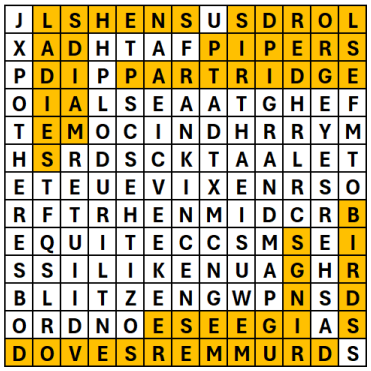
4. **The Twelve Days of Christmas:** The grid contains PARTRIDGE, DOVES, HENS, BIRDS, RINGS, GEESE, MAIDS, LADIES, LORDS, PIPERS, and DRUMMERS, so the missing gift is **SWANS**.

The orange cells in the mini-grids below show where these words can be found, and combining all of the orange cells together results in the larger grid underneath:









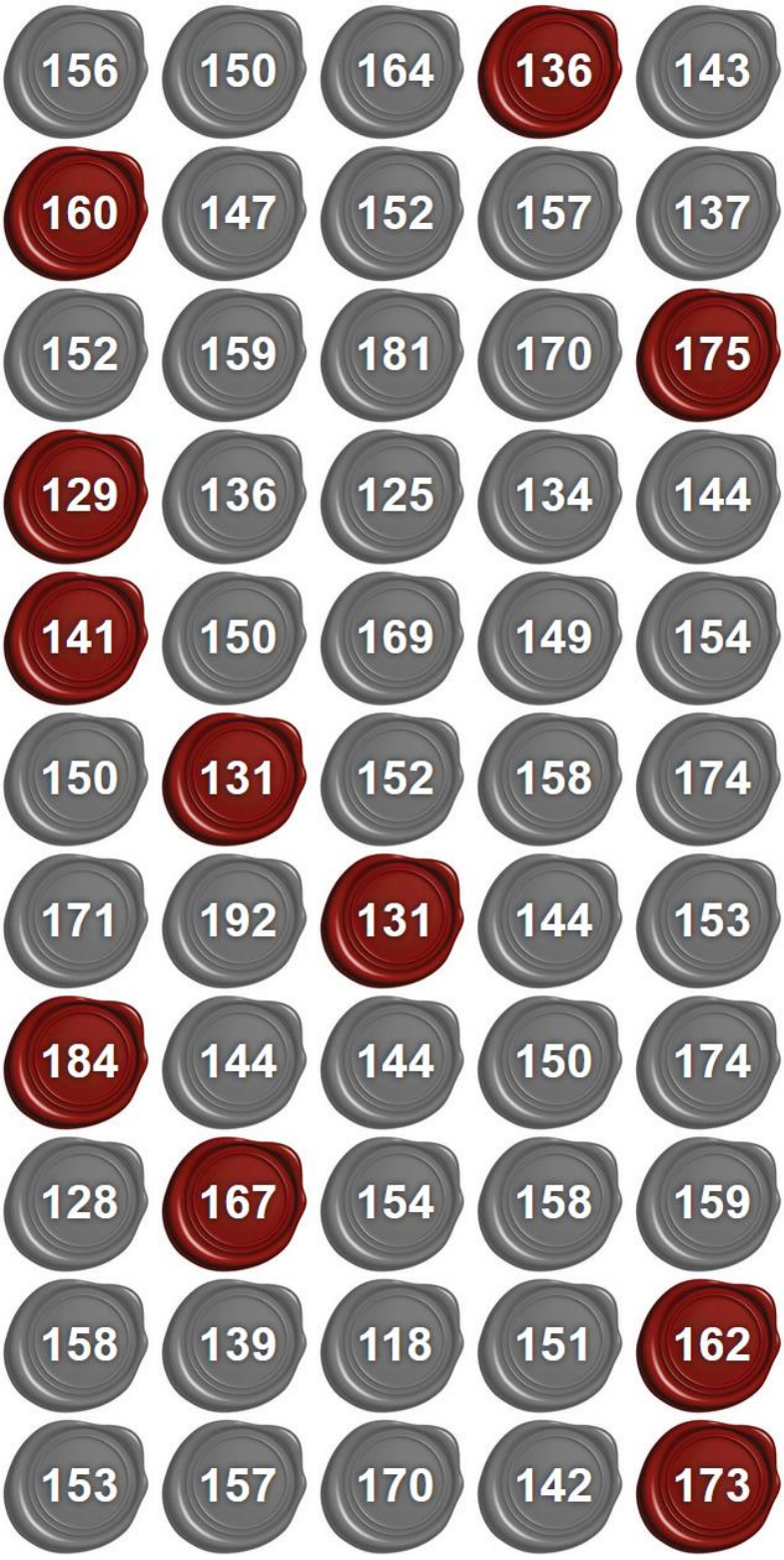
Once the wordsearch is complete, obeying the earlier command **"JOIN THE GAPS"** – i.e. stringing together the unused white letters in the grid, row by row – reveals the final instruction: **JUXTAPOSE THE FIRST LETTERS OF THE MISSING WORDS**. Taking the first letters of the missing items (DONNER, ONE, GOLD, SWANS) yields the solution: **DOGS**.

In terms of additional connections and observations:

- Many solvers pointed out that the reference to *The Twelve Days of Christmas* (and the PARTRIDGE found in the grid) provide a strong thematic link to Puzzle 12, as detailed later in these solutions.
- While searching for the "bear" in Puzzle 3, some solvers spotted that the word "TED" happens to appear in the encrypted wordsearch grid (near the bottom of column 4) and in the decrypted grid (orientated diagonally, using the "E" from VIXEN).
- A couple of solvers highlighted that there were exactly 26 words to find in the grid, matching the number of letters in the alphabet.
- Several solvers noted a neat backwards link to Puzzle 1, item b: the producer of the film *Fanny and Alexander* is Jörn Donner (see here), whose surname matches the missing reindeer in the current puzzle.

Puzzle 5: DIVERGENT SERIES™ [5 points]

(The solution has 11 letters.)



PUZZLE 5 SOLUTION

This puzzle is themed around the UK comedy gameshow ***Taskmaster***, as hinted at by the **"TM" attached to the title** (a common abbreviation for the show) and the **red wax seals**, which mimic those on the show's task envelopes (see here).

The title – *DIVERGENT SERIES* – is a play on words: mathematically, it refers to an infinite series that does not converge, but here it describes **the diverse variety of tasks** that contestants on the show are asked to perform.

Each of the 11 rows represents a specific series of *Taskmaster*. The five seals in each row contain the **final scores of the five contestants** (in the order in which they are seated, which is alphabetically by first name). Solvers needed to **match the scores to the correct series** (using, for instance, the *Taskmaster* wiki here), **identify the contestant corresponding to the red seal**, and then take **the first letter of their first name**, as shown below:

Row	Series	Scores	Contestant (red seal)	Letter
1	8	156, 150, 164, 136, 143	Paul Sinha	P
2	18	160, 147, 152, 157, 137	Andy Zaltzman	A
3	6	152, 159, 181, 170, 175	Tim Vine	T
4	4	129, 136, 125, 134, 144	Hugh Dennis	H
5	19	141, 150, 169, 149, 154	Fatiha El-Ghorri	F
6	15	150, 131, 152, 158, 174	Ivo Graham	I
7	17	171, 192, 131, 144, 153	Nick Mohammed	N
8	14	184, 144, 144, 150, 174	Dara Ó Briain	D
9	9	128, 167, 154, 158, 159	Ed Gamble	E
10	10	158, 139, 118, 151, 162	Richard Herring	R
11	13	153, 157, 170, 142, 173	Sophie Duker	S

Reading the extracted letters in order spells the solution: **PATHFINDERS** (a fitting description of the contestants, who need to find novel ways to solve – or entirely screw up – the diverse tasks).

As many solvers noted, each series of *Taskmaster* features 5 contestants, and the maximum number of points available for a standard task is 5 – so it is fitting that this is **puzzle number 5** in the set, with **5 points available**.

In terms of additional connections and observations:

- The puzzle title, *DIVERGENT SERIES*, was interpreted by some solvers as a celebration of the fact that *Taskmaster* is popular within (and accepting of) the neurodivergent community.

- The *Taskmaster* costume chosen by the first contestant in the table – Paul Sinha – was a dressing gown reminiscent of that worn by Arthur Dent in *The Hitchhiker's Guide to the Galaxy* (see here), providing another link to the ARTHUR theme (Puzzle 3).
- A few solvers mentioned an "Easter egg" in row 10: the contestant highlighted by the red seal is Richard Herring, making him a literal *"red Herring"*.
- An interesting festive connection was also widely noted: Jarred Christmas was one of the contestants in the original Edinburgh Fringe version of the *Taskmaster* show (see here).
- A handful of solvers noted that the 1970s TV drama *Pathfinders* focused on the fictional RAF 192 Squadron (see here), and fittingly, the number 192 appears in the puzzle grid (row 7) as the highest single-series score in *Taskmaster* history, achieved by John Robins (see here). Some solvers even drew a further link between the historical Pathfinders of the RAF and Puzzle 3, noting that the Air Officer Commanding-in-Chief of RAF Bomber Command at the time was Arthur "Bomber" Harris (see here).
- Finally, one solver noted that in the role-playing game *Pathfinder*, there is a "Taskmaster" class (see, for instance, here), providing a further link between the puzzle's theme and its answer.

Puzzle 6: SIX-SEVEN! [7 points]

(The solution has 6 letters.)

The two-player game *Six–Seven!* starts with two piles of 6 and 7 coins – an integer duo that appears to have infiltrated modern culture with all the elegance of a brick through a window. Apologies if their appearance here sets anyone off.

The players alternate turns. On their turn, the active player rolls a respectable six-sided die. If the roll is R, they must remove between 1 and R coins (or all remaining coins, if fewer) from a single chosen pile. (Thus, a roll of 4 permits the removal of 1, 2, 3, or 4 coins.) The player who takes the final coin is the loser – or, to quote the official rulebook, *"gets the L"*.

Under the heroic assumption of optimal play by both sides, determine the probability that Player 1 wins, expressed as a fraction in its lowest terms.

You should find that the numerator and denominator of the fraction each have four digits. To obtain the answer word for this puzzle, add together all eight digits to obtain an integer between 3 and 71, then read off the associated word on the following page.

3: CANDLE

4: GLOVES

5: DASHER

6: UNWRAP

7: WINTER

8: CAROLS

9: GRINCH

10: WONDER

11: STABLE

12: JOSEPH

13: HEARTH

14: ICICLE

15: NUTMEG

16: TINSEL

17: SPIRIT

18: TURKEY

19: ANGELS

20: RIBBON

21: SLEIGH

22: JINGLE

23: FAMILY

24: GROTTO

25: CHIMES

26: BRIGHT

27: WISHES

28: SACRED

29: DANCER

30: FROSTY

31: CHURCH

32: SLEDGE

33: BAKING

34: DONNER

35: GIFTED

36: TOASTY

37: JOYFUL

38: HUMBUG

39: CLOVES

40: MITTEN

41: SEASON

42: CARING

43: LIGHTS

44: JUMPER

45: SMILES

46: MULLED

47: CHEERS

48: DINNER

49: GLORIA

50: WREATH

51: HERALD

52: SPRUCE

53: COOKIE

54: GOSPEL

55: BAUBLE

56: EGGNOG

57: FROZEN

58: HELPER

59: GINGER

60: CHALET

61: WARMTH

62: GIVING

63: BRANDY

64: MANGER

65: THANKS

66: INFANT

67: PRAYER

68: KISSES

69: ADVENT

70: CHILLY

71: SPICES

PUZZLE 6 SOLUTION

Puzzle 6 describes a **stochastic variation** of the game **Nim**, played under ***misère* rules** (i.e. taking the last coin causes you to lose). Unlike standard Nim, where the game state is deterministic and solvable via binary sums, the die roll here introduces randomness, meaning the game must be solved using dynamic programming or backward induction (see here), as sketched below.

Suppose *W(a,b)* is the probability that the current player wins from a state with piles of size *a* and *b*.

- Base cases: $W(0,0)=1$ (the previous player took the last coin and lost, so the current player has won); $W(1,0)=0$ and $W(0,1)=0$ (the current player is forced to take the last coin and lose).
- Recursion: For any other state, the player observes the die roll *R* and chooses to move to the new state (*a'*, *b'*) that **minimises the opponent's win probability** from that new state (i.e. maximises their own win probability, 1 - *W(a', b')*). The value for the current state is **the mean of these best outcomes over the six possible die rolls**.

Solvers needed to compute these values for increasing total numbers of coins until the starting state of (6,7) was reached – these values are shown in the table below, for all relevant states (*a*, *b*) satisfying $a \leq b$. (We can assume $a \leq b$ without loss of generality, as the states (*a*, *b*) and (*b*, *a*) are entirely equivalent.)

State	Coins	Exact probability	Decimal value (to 4 d.p.)
(0, 0)	**0**	**1**	**1.0000**
(0, 1)	**1**	**0**	**0.0000**
(0, 2)	**2**	**1**	**1.0000**
(1, 1)	**2**	**1**	**1.0000**
(0, 3)	**3**	**5/6**	**0.8333**
(1, 2)	**3**	**5/6**	**0.8333**
(0, 4)	**4**	**13/18**	**0.7222**
(1, 3)	**4**	**13/18**	**0.7222**
(2, 2)	**4**	**1/6**	**0.1667**
(0, 5)	**5**	**23/36**	**0.6389**
(1, 4)	**5**	**23/36**	**0.6389**
(2, 3)	**5**	**5/6**	**0.8333**
(0, 6)	**6**	**31/54**	**0.5741**
(1, 5)	**6**	**31/54**	**0.5741**
(2, 4)	**6**	**163/216**	**0.7546**
(3, 3)	**6**	**7/27**	**0.2593**

(0, 7)	**7**	**169/324**	**0.5216**
(1, 6)	**7**	**169/324**	**0.5216**
(2, 5)	**7**	**113/162**	**0.6975**
(3, 4)	**7**	**20/27**	**0.7407**
(1, 7)	**8**	**155/324**	**0.4784**
(2, 6)	**8**	**425/648**	**0.6559**
(3, 5)	**8**	**649/972**	**0.6677**
(4, 4)	**8**	**53/162**	**0.3272**
(2, 7)	**9**	**152/243**	**0.6255**
(3, 6)	**9**	**2453/3888**	**0.6309**
(4, 5)	**9**	**109/162**	**0.6728**
(3, 7)	**10**	**1769/2916**	**0.6067**
(4, 6)	**10**	**14515/23328**	**0.6222**
(5, 5)	**10**	**1103/2916**	**0.3783**
(4, 7)	**11**	**5071/8748**	**0.5797**
(5, 6)	**11**	**1813/2916**	**0.6217**
(5, 7)	**12**	**3859/6561**	**0.5882**
(6, 6)	**12**	**3601/8748**	**0.4116**
(6, 7)	**13**	**5147/8748**	**0.5884**

This calculation reveals that from the position (6,7), the probability that player 1 wins is **5147/8748** (as shown by the final row, highlighted in yellow). Interestingly, the optimal strategy on the first move is always to **remove one coin from the pile of 7 to equalise the piles to (6,6), regardless of the die roll**, as demonstrated by the cells highlighted in blue (which represent all of Player 1's legal first moves) – clearly, picking (6,6) places Player 2 into the state with the smallest win probability.

The eight digits appearing in the numerator and denominator of the fraction 5147/8748 have a total of 5+1+4+7+8+7+4+8 = 44, and looking up the value 44 in the word list provided reveals the solution: **JUMPER**.

Several solvers noticed a hidden message in the word list: reading the first letters of words 13 through 21 (HEARTH, ICICLE, NUTMEG, TINSEL, SPIRIT, TURKEY, ANGELS, RIBBON, SLEIGH) spells out **"HINT: STARS"** – a clue to the theme of Puzzle 13.

In terms of additional connections and observations:

- Echoing the title, it was widely noted that this is puzzle number 6, with 7 points available (or alternatively, at this point in the competition, there have been 6 puzzles, with 7 more to go). In addition, some solvers made the neat observation that the phrase "at sixes and sevens" derives from a dice game called Hazard (see here), linking to the theme of the puzzle.

- A few eagle-eyed solvers noted a graphical "Easter egg" in the image of the coins: the top coin in the stack of 6 depicts a tree with 7 baubles, while the top coin in the stack of 7 depicts a tree with 6 baubles.
- The reason for the digit sum bounds (3 to 71) was explicitly discussed by some solvers: these bounds represent the theoretical minimum and maximum sums for a fraction with a four-digit numerator and denominator, with the lowest being achieved by 1000/1001, and the highest being achieved by 9998/9999 (and others).
- A number of solvers pointed out a "trap": if one accidentally calculates the probability of Player 2 winning (or Player 1 losing), the result is 3601/8748, giving the answer 37 – this is not only the reverse of S=73 (see Puzzle 2 and Puzzle 12), but corresponds to the word JOYFUL, which aligns with the meta-puzzle solution, JOY TO THE WORLD.
- On the topic of the word list, some solvers noticed that it contains several nods to other puzzles. For instance, DONNER (34) is the missing reindeer from Puzzle 4, BAUBLE (55) points to the hidden bear in Puzzle 3, HELPER (58) is an apt description of Alex Horne in Puzzle 5, and so on.
- A couple of solvers highlighted that the solution, JUMPER, has a neat link to Puzzle 2, as Taylor Swift has a famous song called *cardigan* (see here).
- Finally, solvers shared some entertaining comments on the *6-7* "brain-rot" meme (see here). One solver wrote: "On the run-up to Christmas, I was in a ProCook store and felt very sorry for the staff who seemed ready to turn the *Damascus 67* kitchen knives on themselves should they hear another comment about them."

Puzzle 7: ARGYLE PLAYS … IN LINCOLN AT XMAS [4 points]

(The solution has 6 letters.)

In which neighbourhood are we celebrating Christmastime if the individuals illustrated below make a very brief appearance on the screen (along with more than a dozen others)?

(Note: The first name of the person immediately before Joshua is a piece of mathematical terminology.)

What is the meaning of the cryptic puzzle title, and how are the name "John" and the string "IE49963" relevant?

PUZZLE 7 SOLUTION

In the music video for the 1987 hip-hop classic ***Christmas in Hollis*** by Run-DMC (see here), Santa – and later a mischievous elf – scrolls through a collection of names on a computer screen to determine who is "Naughty" or "Nice", with three of the individuals being those illustrated in the puzzle: Wally Wallace (London, England), Michelle Depage (Paris, France), and Joshua Singer (Tel Aviv, Israel).

The solution to the puzzle (i.e. the neighbourhood in which we are celebrating Christmastime) is therefore **HOLLIS** – a residential neighbourhood in the New York City borough of Queens (see here) – which is referenced in the song's title and second verse:

It's Christmastime in Hollis, Queens
Mom's cookin' chicken and collard greens
Rice and stuffing, macaroni and cheese
And Santa put gifts under Christmas trees

The red-and-white striped border of the puzzle illustration mimics the styling of the images in the music video, as shown below (see the video here at the 0m49s mark):

The puzzle's remark regarding the *"person immediately before Joshua"* refers to **Trace Rollins**, who appears on the screen just before Joshua Singer. The term ***"trace"*** is a piece of mathematical terminology (specifically in linear algebra) referring to the sum of the elements on the main diagonal of a square matrix (see here).

The puzzle title, *ARGYLE PLAYS ... IN LINCOLN AT XMAS*, is a reference to the 1988 action film ***Die Hard***, which is famously set on **Christmas Eve**. In an early scene, the limo driver, **Argyle**, plays the song *Christmas in Hollis* on the cassette deck while sitting in his **Lincoln** Town Car (see here) – so **the ellipsis in the puzzle title represents the missing song title, *CHRISTMAS IN HOLLIS***. The remaining clues confirm this cinematic connection: *"John"* refers to the film's protagonist **John McClane** (played by Bruce Willis), who is being driven by Argyle, and *"IE49963"* is the **registration number of Argyle's limousine**. (As many solvers noted, the apparent reference to a football fixture between Plymouth Argyle and Lincoln City – both of which play in League One – was a deliberate red herring.)

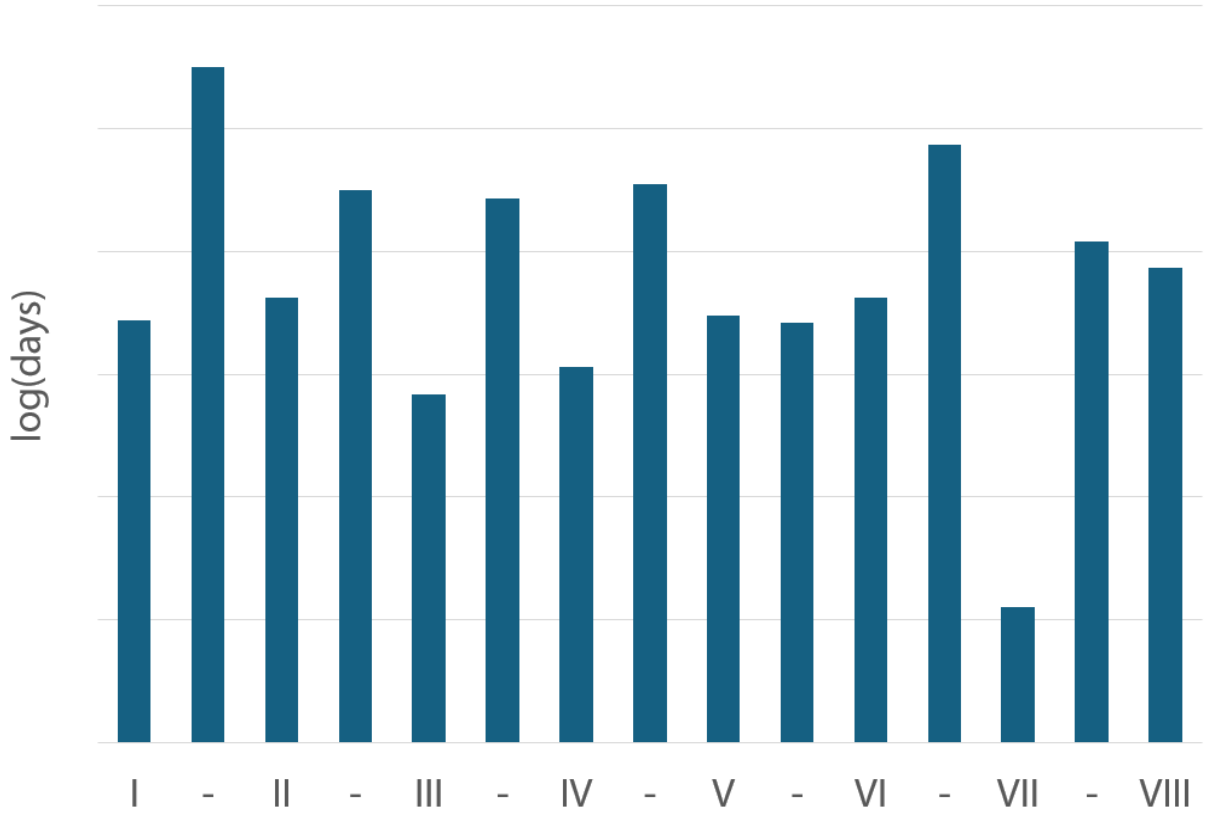
Several solvers also spotted that John McClane's gift for his children – a **giant teddy bear** – is visible in the back seat of the car, and also appears in some later scenes with Argyle (see here), echoing the "Arthur = bear" theme of Puzzle 3.

In terms of additional connections and observations:

- As noted in the meta-puzzle solution, the traditional carol *Joy to the World* is sampled within *Christmas in Hollis*, and can be heard in the music video here at approximately 2m38s. (Some solvers also noted a link to the word CAROLS from the Puzzle 6 word list.) At the end of the video, Santa's sleigh is pulled by a dog rather than a reindeer, echoing the answer to Puzzle 4, DOGS.
- Referencing the puzzle set's overarching "S=73" theme, some solvers noted that John McClane amasses exactly 73 confirmed on-screen kills across the *Die Hard* film franchise (see here), while others noted that the band name Run-DMC sums to 73 (18+21+14+4+13+3) under the A1Z26 mapping.
- Many solvers mentioned Argyle's famous retort to John McClane regarding the choice of song ("*This IS Christmas music!*"), and noted the perennial cultural debate over whether *Die Hard* itself qualifies as a Christmas movie. Others highlighted that John McClane's wife in *Die Hard* is named Holly, adding an extra layer of wordplay to the final answer of HOLLIS (which means "near the holly").
- As a couple of solvers pointed out, the registration number on Argyle's limousine was also used on a vehicle in the 1980s detective series *Remington Steele* (see here – though the plate is given as *1E49963* rather than *IE49963*). Intriguingly, *Remington Steele* also features a Christmas episode entitled *Dancer, Prancer, Donner and Steele* with a similar plot to *Die Hard*, involving an office Christmas party which turns into a hostage situation (see here).
- Finally, the neighbourhood of Hollis, Queens in NYC is located less than 10 miles from the Arthur Ashe Stadium (Puzzle 3) in Flushing, Queens.

Puzzle 8: LONG TIME, NO SEE [5 points]

(The solution has 5 letters.)



PUZZLE 8 SOLUTION

The bar chart displays the durations of the papacies of the **eight Popes** who took the regnal name **URBAN** (the 5-letter solution to the puzzle), along with the intervals between them, as none of the "Urban" papacies were consecutive (see here). As the puzzle is themed around these eight Popes, it is fitting that it is **puzzle number 8**.

The x-axis labels "I" through "VIII" correspond to the reigns of Urban I through Urban VIII, while the dashes (-) represent the "gaps" between successive Urban popes. The y-axis represents the duration in days on a logarithmic scale (base 10), with **the gridlines representing powers of 10**, which is necessary to accommodate the large variance in the time periods involved:

- Urban VII had the shortest papal reign in history, dying just 12 days after his election in September 1590, before he was crowned (see here) – though officially his papacy lasted for 13 days, as part-days are counted (see here).
- Conversely, the gap between the end of Urban I's reign (AD 230) and the election of Urban II (AD 1088) was approximately 313,000 days (over 850 years) – this corresponds to the tallest bar in the chart (log value 5.50).

(Some solvers noted that the precise day counts could vary slightly depending on calendar conventions and the estimated start date of Urban I, but these factors have minimal impact on the logarithmic values plotted in the chart.)

The title *LONG TIME, NO SEE* is a cryptic hint, with the word *"SEE"* referring to the **Holy See** – i.e. the jurisdiction of the Pope (see here). The phrase alludes to the **long periods of time during which the Holy See was not occupied by a Pope named "Urban"** – indeed, there has not been a Pope Urban since 1644.

Finally, some solvers spotted that the starting year of Urban I's reign, **222** (see here), consists entirely of 2s – providing a neat link back to the **Twosday** theme of Puzzle 2.

In terms of additional connections and observations:

- As several solvers noted, the papal address *"Urbi et Orbi"* delivered at midday on Christmas Day (see here) has a linguistic link to the solution, URBAN.
- Many solvers drew a link between the "12-day" reign of Urban VII (see here) and *The Twelve Days of Christmas* theme (Puzzle 4 and Puzzle 12). Others highlighted various cross-puzzle links involving the actor Karl Urban (star of the film *Pathfinder* – see here – echoing Puzzle 5's solution) and the musician Keith *Urban* (see here), who has numerous links to Taylor Swift (Puzzle 2).
- Finally, continuing the dubious festive wordplay, the Quizmaster enjoyed the suggestion from one solver that the *"log"* on the y-axis might be a "yule log".

Puzzle 9: RUNNING UP THAT HILL [9 points]

(The solution has 6 letters.)

The key to cracking the code above is a seasonal character…

> …whose coolness was questioned by a man looking to buy a winter garment (in 1967)
> …whose voice was provided by a man with an exceptionally appropriate surname (in 1976 and 1979)
> …whose namesake starred (from 1992) alongside his real-life brother, who has an apt surname for the current puzzle and a first name that echoes an earlier puzzle

Finally, which of the individuals mentioned above was looking for the solution to the puzzle back in the 1990s?

PUZZLE 9 SOLUTION

The seasonal character required to crack the code is **JACK FROST**, who is identified by the three clues as follows:

- 1967: In his song *Sell Me a Coat*, **David Bowie** sings the line: *"Jack Frost took her hand and left me / **Jack Frost ain't so cool**"* (see here).
- 1976 and 1979: Jack Frost was voiced by **Paul Frees** (whose surname is, appropriately, a homophone of "freeze") in the Rankin/Bass specials *Frosty's Winter Wonderland* and *Rudolph and Frosty's Christmas in July* (see here).
- 1992 onwards: **David Jason** starred as **DI Jack Frost** in the ITV detective series *A Touch of Frost* (see here), where he appeared alongside his real-life brother, **Arthur White** (playing PC Ernie Trigg – whose surname has a mathematical ring to it). The surname "White" is apt for the snowy theme, while the first name "Arthur" echoes the solution to Puzzle 3.

As some solvers noted, *Sell Me a Coat* is track 2 on Bowie's 1967 album *David Bowie*, with track 1 being ***Uncle Arthur*** (see here), providing a neat link back to Puzzle 3. In addition, the founders of **Rankin/Bass Productions** (who produced countless Christmas specials, including the two noted above) were **Arthur Rankin Jr** and Jules Bass, continuing the "Arthur" theme (see here).

The puzzle title – *RUNNING UP THAT HILL* – and the grouping of the ciphertext into three-letter blocks are clues that the code is a **Hill cipher** employing a 3×3 matrix (see here).

Using the standard integer mapping for the Hill cipher (A=0, B=1, …, Z=25), the key phrase **JACK FROST** corresponds to the following matrix, which was used to encode the plaintext as ciphertext:

$$M = \begin{pmatrix} 9 & 0 & 2 \\ 10 & 5 & 17 \\ 14 & 18 & 19 \end{pmatrix}$$

Decrypting the message – i.e. reversing the process – therefore requires solvers to first calculate the modular inverse of this matrix (modulo 26), which is shown below:

$$M^{-1} = \begin{pmatrix} 21 & 8 & 18 \\ 2 & 13 & 21 \\ 10 & 16 & 23 \end{pmatrix}$$

For each 3-letter block of ciphertext in the puzzle image, solvers then needed to convert the block into a 3×1 column vector of numerical values (A=0, B=1, ... Z=25), pre-multiply this vector by the inverse matrix, and treat the result modulo 26 to recover a 3-letter block of plaintext.

For example, the first block of the ciphertext is **XHA**, which is represented by the numbers **X** = 23, **H** = 7, **A** = 0. If these three values are treated as a column vector, and multiplied by the modular inverse matrix shown above, the result is:

$$\begin{pmatrix} 21 & 8 & 18 \\ 2 & 13 & 21 \\ 10 & 16 & 23 \end{pmatrix} \begin{pmatrix} 23 \\ 7 \\ 0 \end{pmatrix} = \begin{pmatrix} (21 \times 23) + (8 \times 7) + (18 \times 0) \\ (2 \times 23) + (13 \times 7) + (21 \times 0) \\ (10 \times 23) + (16 \times 7) + (23 \times 0) \end{pmatrix} = \begin{pmatrix} 539 \\ 137 \\ 342 \end{pmatrix}$$

Taking these values modulo 26, we obtain the vector:

$$\begin{pmatrix} 539 \pmod{26} \\ 137 \pmod{26} \\ 342 \pmod{26} \end{pmatrix} = \begin{pmatrix} 19 \\ 7 \\ 4 \end{pmatrix}$$

Translating these values back to letters (19 = **T**, 7 = **H**, 4 = **E**) yields **THE**, which is the first 3-letter block of the plaintext.

Repeating the above process for all the 3-letter blocks in the puzzle (and inserting spaces appropriately) yields the decrypted message:

THE NAME THAT LINKS THE INVENTOR OF THIS CIPHER AND THE VOICE OF JESSICA CLAUS IN NINETEEN SEVENTY

The inventor of the Hill cipher was **Lester S. Hill** (see here), while the character of Jessica Claus (depicted in the puzzle's background image) was voiced by **Robie Lester** in the 1970 Rankin/Bass special *Santa Claus Is Comin' to Town* (see here), so the name that links them – and thus, the solution to the puzzle – is **LESTER**.

Some solvers additionally observed that the ciphertext appears in a perfect **9×9 square**, and the Hill cipher matrix has **9 elements** – it is therefore appropriate that this is **puzzle number 9** in the set.

Turning to the final part of the puzzle, the individual mentioned in the clues who was *"looking for the solution"* (i.e. Lester) in the 1990s is **David Bowie**, who released the instrumental track ***Looking for Lester*** (see here) on his 1993 album *Black Tie White Noise* (featuring jazz trumpeter Lester Bowie, who curiously was no relation to David).

In terms of additional connections and observations:

- Several solvers noted that the "dCode.fr" website includes "Hill decoder" and "Hill encoder" tools for working with Hill ciphers (see here), which can be used to decrypt the above message.
- A number of solvers noted that the puzzle image itself reinforces the "*Hill*" theme whilst also echoing a scene from *Santa Claus Is Comin' to Town* featuring Kris Kringle and the future Jessica Claus (see here). Paul Frees, from the second clue, also provided multiple voices for this film (see here).
- While Paul Frees voiced Jack Frost in *Frosty's Winter Wonderland* (1976) and *Rudolph and Frosty's Christmas in July* (1979), in the specific 1979 TV special titled *Jack Frost* (see here), Frees instead voiced Father Winter / Kubla Kraus, while Jack Frost was voiced by Robert Morse (arguably another apt surname, given the puzzle's code-based nature).
- As several solvers noted, Jack Frost also appears in the lyrics of Puzzle 7's *Christmas in Hollis* (see here): *Jack Frost chillin', the orchids out / And that's what Christmas is all about.* Others spotted FROSTY in the Puzzle 6 word list.
- One solver made the neat observation that the surname of Arthur Rankin Jr, RANKIN, can be found nestled inside the word FRANKINCENSE (Puzzle 4).
- The puzzle title – *RUNNING UP THAT HILL* – was recognised by many solvers as not just a cipher hint, but as a reference to Kate Bush's *Running Up That Hill (A Deal With God)*, which enjoyed a recent resurgence thanks to *Stranger Things*, and featured on Bush's album *Hounds of Love* (see here), providing a link to Puzzle 4's solution, DOGS. Some solvers also noted the existence of a cover version by the musician Anita Lester (see here), providing a bonus connection to the answer, LESTER.
- Diving even deeper into *A Touch of Frost*, a few solvers noted that the very first episode *Care and Protection* (based on the festively titled book *Frost at Christmas*) involves Jack Frost looking for a missing girl named Tracy Uphill (see here) – neatly tying into the last three words of the puzzle title. Others highlighted that *A Touch of Frost* features a character named Lester Bryce-Jones in the episode *Appendix Man* (see here), providing an additional link to the final answer, LESTER.
- Additionally, it was reported in 2023 that David Jason (who plays DI Jack Frost) had reunited with a previously unknown daughter whose mother is named Jennifer Hill (see here), providing another link to the puzzle's "Hill" theme.

- A few solvers also noted that David Jason famously played Del Boy in *Only Fools and Horses* (see here) alongside Rodney – a name shared by one of the racehorses in Puzzle 1, item h.
- David Bowie's digitally manipulated alto sax on *Black Tie White Noise* was referred to as the "Dog Sax" (see here), echoing the solution to Puzzle 4, DOGS. Some solvers also drew a link between the album's lead-off single, *Jump They Say* (see here), and the solution to Puzzle 6, JUMPER, and a few even extended this connection to Jeremiah the bullfrog from the opening line of *Joy to the World* (see meta-puzzle).
- Finally, one solver noted an entertaining festive connection dating back to the 1970s – the name "Arthur White" (David Jason's brother) also appears in the following fictitious "cast list" for a well-known Christmas song, courtesy of comedians The Goodies (see here for the source, and here for background on The Goodies):

  Emma Dreaming
  Arthur White
  Chris Muss
  Jess Likedy
  Juan Swee
  Hugh Sterno

  Wendy Treetops-Glissen
  Ann Chilled-Wren
  Liz Anne
  "Two Ears" Laybelle
  Cindy Snow

  Emma Dreaming
  Arthur White
  Chris Musswit
  Avery Criss
  Miss Carr
  Dai Wright

  Mayor Dazeby
  Mary-Ann Bright
  Anna-May Hall-York-Rhys
  Mrs B White

Puzzle 10: CIRCLE OF LIFE [10 points]

(The solution has 9 letters.)

On Boxing Day, Phil and Rita settle down to watch television, having exhausted all other civilised forms of activity. They encounter a 'Christmas' film involving a Ferris wheel which announces its intention to be emotionally devastating and makes good on the promise. They are both sure they have seen it before.

Switching channel, they stumble upon *The 0.0001% Club* – a puzzle gameshow so fiendish that it makes *Only Connect* look like daytime TV for toddlers. It's the final jackpot round, and the assembled boffins are told they have exactly 30 minutes to crack the puzzle below and find the secret 9-letter solution (with the aid of their trusty computers, and any online tools they wish). They all fail – spectacularly, and in high definition. Can you do better?

(Note: The 9-letter solution to the puzzle shown above is the answer contributed to the meta-puzzle.)

Finally…

- Identify another pattern (ultimately leading to one of those above) that not only echoes another problem proposed by the same mind, but also evokes Christmas.
- Drawing the theme to a close, identify the obscured extract below (from a brilliant play by one recently departed) which mentions one of the above patterns. Which individual appearing in an earlier puzzle's solution was presumably an expert on this substance, given his name?

•h•n •o• •t•r •o•r •i•e •u•d•n•, •e•t•m•s, •h• •p•o•f•l •f •a• •p•e•d• •t•e•f •o•n• •a•i•g •e• •r•i•s •i•e •h• •i•t•r• •f • •e•e•r •n •y •s•r•n•m•c•l •t•a•. •u• •f •o• •t•r •a•k•a•d, •h• •a• •i•l •o• •o•e •o•e•h•r •g•i•. •n•e•d, •h• •u•d•n• •o•s •o• •o•i•e •n• •o•t•n•e• •o •u•n •i•k •u•t •s •e•o•e. •o •o• •h•n• •h•s •s •d•?

(Note: The visible letters are those that are *even in location*.)

PUZZLE 10 SOLUTION

The final word of the puzzle's title and the pixelated "sprites" around the wheel both pointed solvers towards **Conway's Game of Life** (see here), the cellular automaton devised by mathematician **John Horton Conway**. The puzzle text reinforces this theme: the *'Christmas'* film involving a Ferris wheel is ***Christmas in Conway*** (see here); the reference to *The 0.0001% Club* is both a play on ITV's *The 1% Club* and a nod to the song *One in a Million* by **Conway Twitty** (see here); and the mention of *Only Connect* references the fact that the evolution of a Game of Life pattern **depends only on each cell's adjacent connections**.

The wheel contains 15 wedges, each depicting a Game of Life pattern, and it turns out that each one is an **oscillator** that returns to its original state after a fixed number of generations (in one case, this happens after one generation – i.e. it is a "still life"). This **cyclical / periodic behaviour** is echoed by the title, ***CIRCLE OF LIFE***, by the **Ferris wheel** in the puzzle text, and by the reference to Phil and Rita (the main characters of ***Groundhog Day*** – see here) being *"sure they have seen it before"*.

Solvers needed to determine **the period of each oscillator** (i.e. the number of generations in its loop) and convert that number to a letter using the standard A1Z26 mapping. Reading clockwise from the top red wedge, solvers should have obtained the following table:

Wedge	Name of pattern	Period	Letter
1 (red)	Blinker	2	B
2	29P9	9	I
3	p18 phase shifter	18	R
4	Mold on fumarole	20	T
5	Figure eight	8	H
6	Rob's p16	16	P
7	Mold on fire-spitting	12	L
8	Block ("still life")	1	A
9	Caterer	3	C
10	Pseudo-barberpole	5	E
11	Pentadecathlon	15	O
12	Unix	6	F
13	24P10	10	J
14	Blocker	8	H
15 (grey)	Jam	3	C

(All of these patterns can be found on the "LifeWiki" website (see here), and almost all of them are the **smallest known oscillators for their specific period**, as indicated by the "Smallest known" column of the table shown at the above link.)

The 15 letters in the final column of the table above spell out **BIRTHPLACE OF JHC**. Interpreting "JHC" as **John Horton Conway**, solvers should have deduced that the nine-letter answer is **LIVERPOOL**. Conway was born in Liverpool on **Boxing Day, 1937** (see here) – another instance of "37" – explaining the reference to Boxing Day in the first line of the puzzle. (A few solvers were tempted by a slightly un-seasonal misreading of "JHC" as "Jesus H. Christ", leading to the answer "Bethlehem", but the strong Conway framing should have confirmed Liverpool as the desired solution.) Continuing the web of connections, in December 2025, a **Liverpool student won the largest-ever jackpot of £100,000 on *The 1% Club*** (see here), linking the fictional gameshow in the puzzle to its solution.

Turning to the *"Finally..."* section:

- The other pattern that echoes *"another problem proposed by the same mind"* is the **ANGEL** (see here). In the Game of Life, the Angel pattern evolves into a Blinker (wedge number 1 in the puzzle) after several generations; its name naturally evokes Christmas and references the ***"Angel Problem"*** devised by Conway (see here), sometimes known as the *"Angels and Devils game"*. Fittingly, the word ANGELS also appears in the Puzzle 6 word list.
- The pink, obscured text is an extract from ***Arcadia*** **by Tom Stoppard**, the *"recently departed"* playwright in the text, who – like Conway – was born in **1937**. As per the note, the text displays only the letters in the even positions of each word, and the full quote is the famous passage regarding entropy (see here): *"When you stir your rice pudding, Septimus, the spoonful of jam spreads itself round making red trails like the picture of a meteor in my astronomical atlas. But if you stir backwards, the jam will not come together again. Indeed, the pudding does not notice and continues to turn pink just as before. Do you think this is odd?"* (Numerous solvers noted that the **cyclical motion of stirring the rice pudding** mirrors the periodic nature of the Game of Life oscillators, while the **pink text** colour reflects the word *"pink"* within the quote. Furthermore, the mention of *"rice"* in the quote evokes lyricist **Tim Rice**, who wrote the words to ***Circle of Life*** (see here), echoing the title.)
- The extract explicitly mentions **"JAM"**, which is also the name of the oscillator in wedge 15. The individual appearing earlier who was *"presumably an expert on this substance"* is of course **JAM MASTER JAY** (of Run-DMC) from Puzzle 7, whose name flashes up on the "Naughty or Nice" screen in the music video to *Christmas in Hollis*.

- The *"even in location"* hint was intended to nudge solvers towards *Arcadia*, via the phrase "*Even in Arcadia*" (which, as several solvers noted, achieved unusual prominence in 2025 as the title of Sleep Token's UK number 1 album – released alongside various codes and ciphers, as described here). More fundamentally, however, **the title of Stoppard's play *Arcadia* (see here) was originally *Et in Arcadia ego* ("Even in Arcadia, there am I")** – an ancient phrase that references (somewhat un-festively) the inevitable presence of **Death** – which is why this final section on *Arcadia* in a puzzle themed around **Life** is described as *"drawing the theme to a close"*.

In terms of additional connections and observations:

- Many solvers noted that the design of the wheel in the puzzle was reminiscent of the wheel that determines players' fates in the classic board game, *The Game of Life* (see here). A neat link back to Puzzle 5 (and Puzzle 3) was also widely identified: *Taskmaster* contestant Ivo Graham was nominated for Best Show at the 2019 Edinburgh Festival Fringe for a show titled *The Game of Life*, about becoming a father (see here). Several other solvers linked the puzzle title, *CIRCLE OF LIFE*, to the birth of the Quizmaster's son, Arthur (Puzzle 3).

- A few solvers noted that John Conway's "Doomsday algorithm" for calculating the day of the week for any given date involves the mnemonic "Twosday" (see here), echoing the "Twosday" theme of Puzzle 2 – with some also spotting that Conway invented the algorithm in 1973 (another "73"). A couple of solvers also noticed that Taylor Swift's song *22* (mentioned in Puzzle 2) was partially recorded at Conway Recording Studios in LA.

- John Conway co-authored a book on octonions (see here), providing a connection back to Arthur Cayley in Puzzle 3, and was also a pioneer in the field of combinatorial game theory (see here), providing a neat link to the *Nim*-like game in Puzzle 6. In addition, John Conway invented a pencil-and-paper game called Sprouts (see here), whose name is a traditional Christmas vegetable – in fact, this connection formed the basis of a puzzle in the 2018 RSS Christmas Quiz (see here)!

- Other Game of Life patterns whose names were relevant to other puzzles were widely noted, with the most popular examples being the "waterbear" (see here), echoing Puzzle 3, and "Die Hard" (see here), echoing Puzzle 7.

- Expanding on the link between *The 0.0001% Club* and Conway Twitty's *One in a Million*, a few solvers noted that Conway Twitty covered the Three Dog Night version of *Joy to the World* mentioned in the meta-puzzle (see here), and his song *The Clown* was co-written by Charles Chalmers from Puzzle 1 (see here).

- The Groundhog Day reference also unlocked a variety of neat connections. Groundhog Day is celebrated on 2 February or 2/2 (see here) – a date consisting entirely of twos, like Twosday (Puzzle 2). Tying into the Arthur/bear theme (Puzzle 3), an archaic scientific name for the groundhog is *Arctomys monax* or "bear-rat", and Groundhog Day's origins are said to be rooted in "ancient European weather lore", in which a badger or sacred bear made the prediction (see here). Furthermore, the 1979 Rankin/Bass *Jack Frost* TV special (Puzzle 9) is narrated by a groundhog called Pardon-Me-Pete (see here). Finally, the person credited with conceiving the idea of Groundhog Day was Clymer Freas (see here), whose surname is a homophone of "freeze" – exactly like Paul Frees (Puzzle 9).
- As pointed out by several solvers, *Arcadia* played at The Old Vic in early 2026, following the passing of Tom Stoppard, with a summer 2026 West End transfer recently announced (see here). Other solvers noted that another of Stoppard's famous plays is called *Jumpers*, echoing the Puzzle 6 solution, JUMPER.
- A handful of solvers highlighted a neat link between the Arcadia *"rice pudding"* text and a quote by tennis legend Arthur Ashe, winner of the 1968 US Open (Puzzle 3), as reported by many sources, including a 2018 WSJ write-up (see here): *'He also was the lone African-American among 128 players in the men's draw—in his words, as "noticeable as the only raisin in a rice pudding."'*
- The appearance of only the *"even"* letters and the "round" wheel were imaginatively interpreted by some solvers as being a festive nod to Good King Wenceslas (see here), who looked out *"on the feast of Stephen"* (i.e. Boxing Day), *"when the snow lay round about, deep and crisp and even*". Others noted that it was appropriate for the quote to close with the words *"Do you think this is odd?"* when it is precisely the odd letters that have been obscured.
- Finally, with this puzzle featuring a mixture of "deep" themes, a wheel, and *Arcadia*, one solver highlighted a remarkable connection to Puzzle 3: the novel that won Harry Josephine Giles the 2022 Arthur C. Clarke Award was called *Deep Wheel Orcadia* (see here).

Puzzle 11: GÖRDLE [7 points]

(The solution has 8 letters.)

92765279515954578804409256946521314239139359156188964843750	
16645684989772790377369886416302220358505473201745510014400729511200	
2929433911131573528285634605331236989042323897734215134771591676643643709400000000000000	
1254761443743936623541501477490185808882667475196650065425891026801525468079297709485794225954539905542300189917184 0	

PUZZLE 11 SOLUTION

GÖRDLE – a mash-up of **Gödel** and ***Wordle*** – combines the logic of the popular word game (see here) with the concept of **Gödel numbering**, a mathematical method to encode a sequence of symbols as a unique natural number via prime factorisation (see here and here). The Gödel numbering technique is valuable as it essentially allows "statements about statements" to be transformed into "statements about numbers" – indeed, it plays a central role in the proof of Gödel's first incompleteness theorem (see here).

The puzzle presents four huge integers, **each representing a Gödel-style encoding of an eight-letter word**. To decode them, solvers needed to **find the prime factorisation of each integer**, which in each case involves only the first eight prime numbers (2, 3, 5, 7, 11, 13, 17, and 19). The **exponent of each prime then corresponds to a letter of the alphabet** using the standard A1Z26 mapping, as shown below:

Row	Prime factorisation	Exponents	Decoded word
1	$2^{1}\,3^{12}\,5^{16}\,7^{8}\,11^{1}\,13^{2}\,17^{5}\,19^{20}$	1, 12, 16, 8, 1, 2, 5, 20	ALPHABET
2	$2^{6}\,3^{1}\,5^{3}\,7^{20}\,11^{15}\,13^{18}\,17^{5}\,19^{4}$	6, 1, 3, 20, 15, 18, 5, 4	FACTORED
3	$2^{14}\,3^{21}\,5^{13}\,7^{5}\,11^{18}\,13^{1}\,17^{12}\,19^{19}$	14, 21, 13, 5, 18, 1, 12, 19	NUMERALS
4	$2^{17}\,3^{21}\,5^{1}\,7^{14}\,11^{20}\,13^{9}\,17^{20}\,19^{25}$	17, 21, 1, 14, 20, 9, 20, 25	QUANTITY

These four words **thematically describe the puzzle's mechanics** and **serve as the four "guesses" for the eight-letter Wordle grids** on the right of the puzzle:

Applying the standard Wordle colour logic (i.e. Green = correct letter and position; Yellow = correct letter but wrong position; Grey = incorrect letter) reveals that the

solution is **an eight-letter word fitting the pattern _ _ M _ O _ _ _ and containing the letters B, C, I, L, S, and Y**. The only valid word that fits – and thus the solution to the puzzle – is:

As many solvers noted, **SYMBOLIC** is a particularly appropriate final answer, given the theme of Gödel numbering.

Only a handful of solvers noted that the number corresponding to SYMBOLIC is 2^{19} 3^{25} 5^{13} 7^{2} 11^{15} 13^{12} 17^{9} 19^{3}, which is equal to:

21033862100282203103437324210825111483444074166422663715142400000000000000

This number has **exactly 73 decimal digits**, providing a further link to the integer **S=73** appearing throughout the puzzle set.

In terms of additional connections and observations:

- A couple of solvers mentioned that they performed the calculations using the *Wolfram Alpha* website (see here) – an excellent tool for anyone without access to dedicated software on their machine.
- Several solvers noted that the puzzle number (11) and the points available (7) both belong to the set of primes used in the puzzle, and are in fact the middle two primes. Furthermore, the sum of the eight primes used is 77 (i.e. 7×11).

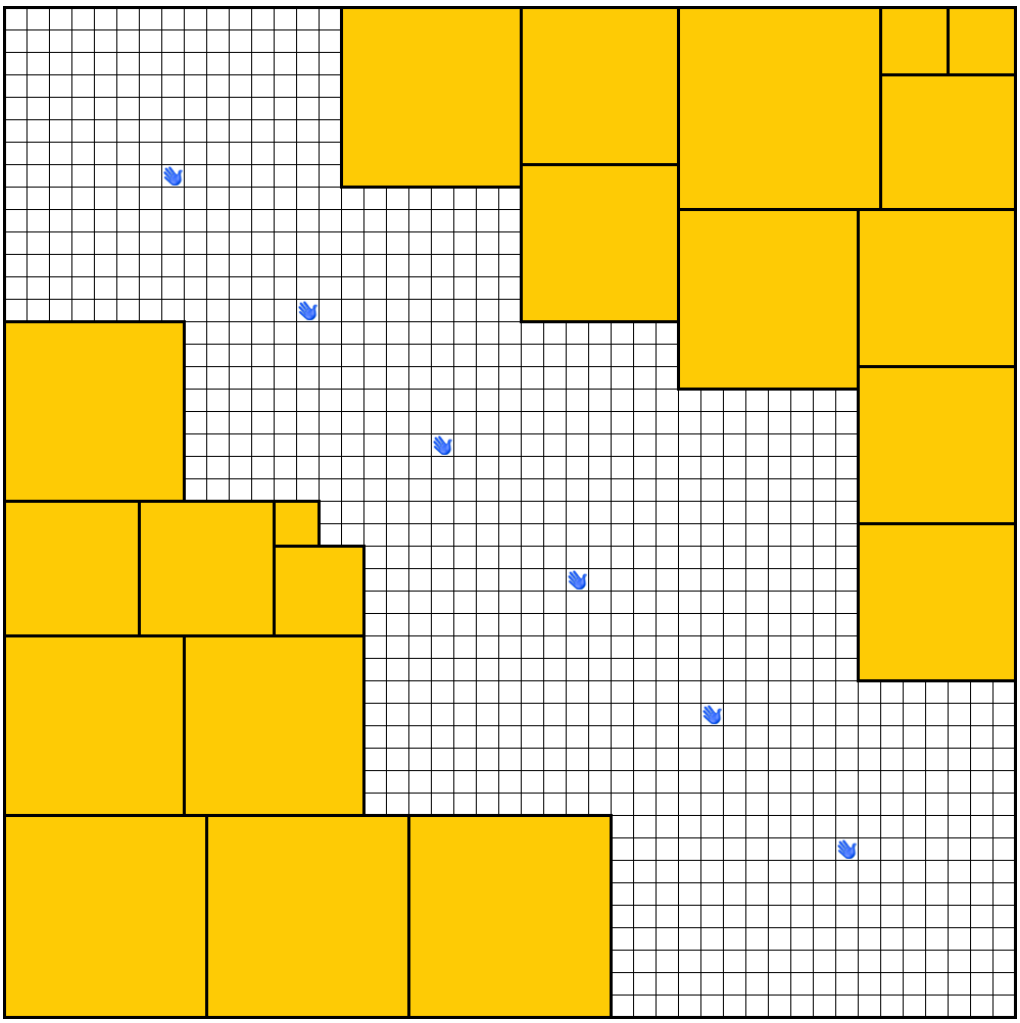
Puzzle 12: … A.P.T. (2025) [9 points]

(The solution has 6 letters.)

It's Christmastime at the holiday camp, and the events board is filling up as quickly as the apartments. Today's schedule includes a morning stroll to see the Punch & Judy show on the promenade, a festive afternoon sing-along, and tucked between them, an invitation to "*visit the music hall for today's puzzle*".

Upon entering the hall, you see that a 45×45 grid has been laid out across a table, containing a selection of carefully placed squares (see diagram below). To complete the puzzle, the remaining squares must be added so that the final arrangement comprises **one 1×1 square, two 2×2 squares, three 3×3 squares, …, nine 9×9 squares**, all fitting in the grid with no overlaps or gaps.

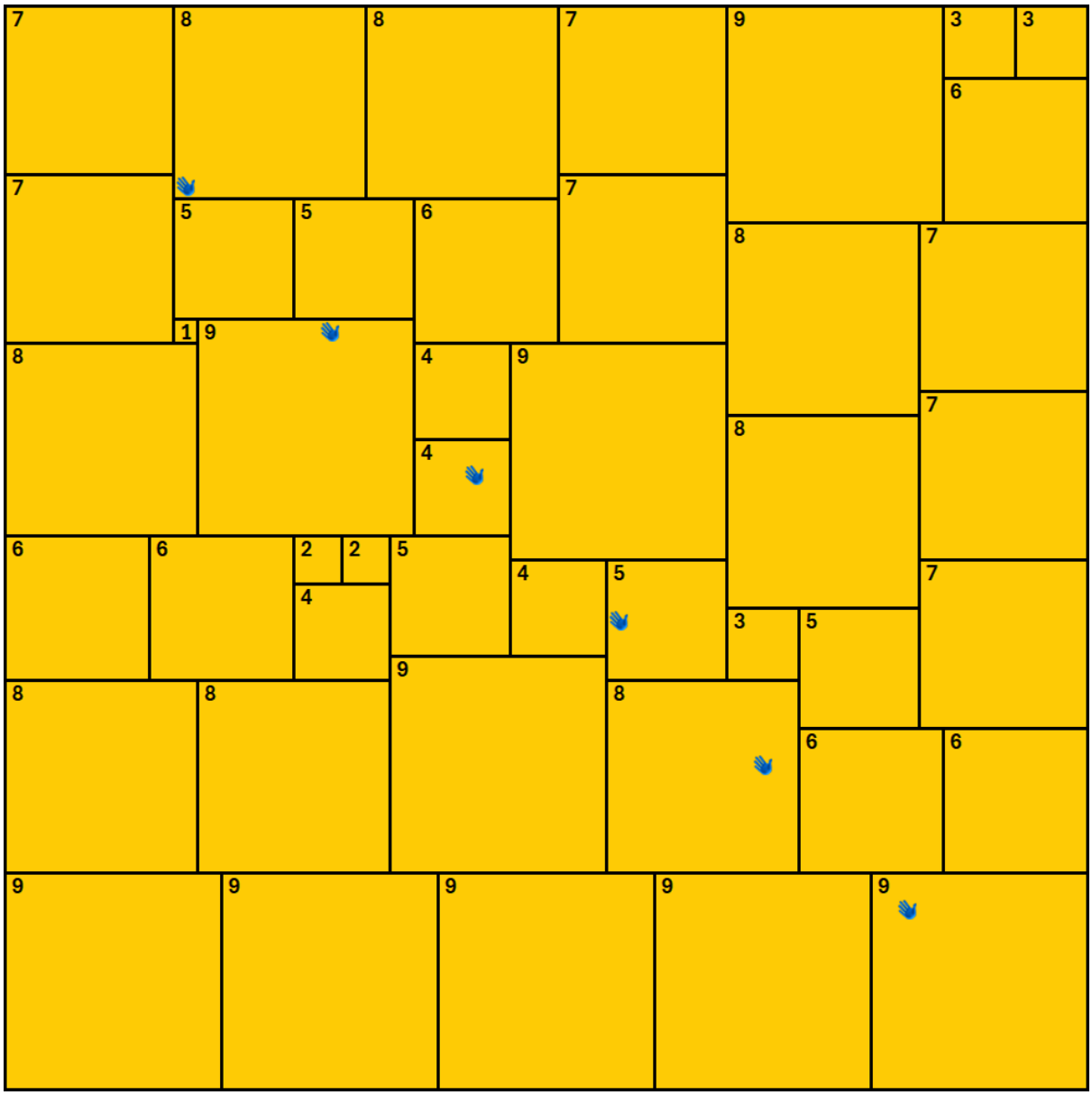
Can you complete the grid, and identify the mathematical relationship it exemplifies? Finally, what is revealed by the six cells marked with hands – and which associated character might have felt a special affinity for this puzzle?



PUZZLE 12 SOLUTION

In this puzzle, solvers needed to finish the tiling of the 45×45 square grid using a specific collection of smaller squares: one 1×1 square, two 2×2 squares, three 3×3 squares, and so on, up to nine 9×9 squares.

The unique arrangement that completes the partial tiling in the puzzle appears below, with the size of each constituent square appearing in its top-left corner:



Clearly, the k squares of size $k \times k$ have a total area of k^3 (for each k from 1 to 9), and the whole grid has an area of $45^2 = 2025$ which can be written as $(1 + 2 + 3 + \ldots + 9)^2$, since 45 is the sum of the integers 1 to 9. The area-equivalence of the whole grid and its constituent squares is therefore an example (for $n = 9$) of ***Nicomachus's theorem***

(see here) – i.e. the sum of the first *n* cubes equals the square of the sum of the first *n* integers:

$$\sum_{k=1}^{n} k^3 = \left(\sum_{k=1}^{n} k \right)^2$$

More specifically, the problem of perfectly packing the given squares into the large grid without overlap (which is not in fact possible for small values of *n*) is known as a **Partridge puzzle** (see here). The name – coined by Robert T. Wainwright – reflects how the increasing number of squares of each size is reminiscent of the gifts in ***The Twelve Days of Christmas*** (although the above formula does not actually give the total number of gifts in the song, which are tetrahedral numbers – see here). This festive connection was signposted by the ***"festive afternoon sing-along"*** mentioned in the text, and the fact that this is **puzzle number 12**. Given the significance of both the year 2025 (= 45^2) and the festive nomenclature, several solvers highlighted that **Christmas 2025 offered uniquely "apt" timing for such a puzzle**, with the next opportunity (*n* = 10) not coming round until the year 3025.

(As a brief aside, some excellent Partridge puzzle resources are available on the website of Matthew Scroggs, co-editor of *Chalkdust* and co-writer of Puzzle 4 – see here and here. In particular, the Quizmaster found Matthew's file of Partridge puzzle solutions very helpful in streamlining the validation of the puzzle – many thanks! The topic has also been featured in one of Matt Parker's videos – see here.)

Returning to the tiling (see previous page), six of the cells are marked with "waving hands", each falling inside a specific square. Reading the side lengths of these squares in order along the main diagonal, from top-left to bottom-right, gives the sequence (8, 9, 4, 5, 8, 9), and converting these into letters via the A1Z26 mapping spells out the solution: **HI-DE-HI**.

This answer refers not only to the *"hands"* on the grid (which are **waving "hi!"**), but also to the classic BBC sitcom ***Hi-de-Hi!*** (see here), which is set at the fictional "Maplins" holiday camp (echoing the puzzle's first paragraph) and features the Yellowcoats (as per the **yellow/orange colouring** of the squares – see image below).

The *Hi-de-Hi!* character who would have felt a special affinity for this "Partridge puzzle" is of course **Mr Partridge** (played by Leslie Dwyer), the camp's **curmudgeonly and hard-drinking Punch & Judy performer**, who was a former music hall act. The puzzle text's references to the *"music hall"* and *"Punch & Judy show"* corroborate this connection, and the latter reference provides a second connection to the *"hands"* on the grid, via the **glove puppets** in Mr Partridge's show (see here). In addition, Mr Partridge's famous repeated line ***"Listen to that silly cow!"*** (see here) provides a neat callback to the misfortunes of Grady in Puzzle 2.

Continuing the "Partridge" theme, solvers should have interpreted the three letters in the title … *A.P.T. (2025)* as representing the final three words of *"A Partridge In **A Pear Tree***", with the number 2025 being the total number of cells in the grid, and the year of the puzzle competition. (Partial credit was awarded for interpreting "A.P.T." simply as "A Partridge Tiling", as the ellipsis beforehand is more difficult to justify.) There was also a secondary interpretation to the title: "*A.P.T.*" evokes the recent ROSÉ & Bruno Mars hit ***APT.*** (which is hinted at by the mention of *"apartments"*), and in fact, this song's title derives from a **Korean drinking game involving the stacking of hands**. This game would undoubtedly have appealed to the **regularly inebriated** Mr Partridge, and provides a third and final interpretation of the *"hands"* on the grid.

In terms of additional connections and observations:

- Whilst researching Partridge puzzles, some solvers discovered that Robert T. Wainwright first presented the puzzle in its 12×12 form (see here) – emphasising the connection to *The Twelve Days of Christmas*. Furthermore, Wainwright was an enthusiastic researcher of Conway's Game of Life (Puzzle 10), publishing the 1970s newsletter *Lifeline* and discovering several important oscillators (see here). Some solvers noted that a further connection between

the current puzzle and John Conway (Puzzle 10) is provided by the "Conway puzzle" (see here), a similar 3D block-packing problem.

- In a delightful coincidence, a different "John Conway" (not the mathematician in Puzzle 10) was a Canadian puppeteer who created the characters Uncle Chichimus and Hollyhock (see here) – often described as the "Canadian Punch and Judy". Hollyhock's name has a festive flavour, and the pair first appeared in 1952 – exactly 73 years ago. Furthermore, some of Conway's puppetry materials were held by the Canadian Museum of History in "Hull" (now "Gatineau"), giving a bonus link to the meta-puzzle (see here).
- The Punch & Judy theme also provides another link: the band XTC performed a song called *Punch and Judy*, written by Andy Partridge (see here).
- Some solvers drew a link between the "hands" in the puzzle and the phrase "6-7" (Puzzle 6), which is often accompanied by a hand gesture (see here).
- Several solvers also mined the series *Hi-de-Hi!* for a brilliant array of further connections. The pilot aired in 1980 (see here) – the same year as Puzzle 4's *There's No One Quite Like Grandma* – which is exactly 45 years prior to 2025, echoing the 45×45 grid size. One of the central *Hi-de-Hi!* characters, Ted Bovis, provides a link to the bear theme in Puzzle 3, both through his name and "teddy-boy" styling (see here) – and the actor who played Ted (Paul Shane) also appeared in an episode of Puzzle 9's *A Touch of Frost* (see here). The standard response to the titular greeting *"Hi-de-Hi!"* is *"Ho-de-Ho!"*, which certainly has a Santa-esque vibe. Finally, the word CHALET in the Puzzle 6 word list provides a nod to the overall holiday camp theme.
- In a neat link to Puzzle 3's ARTHUR theme, some solvers mentioned that Arthur Stone (see here) was the first mathematician to propose the similar "squared square" problem, and a couple of solvers who tackled Puzzle 12 programmatically using Python noted that the language's name comes from *Monty Python* (see here), echoing Puzzle 3's King Arthur quote.
- Picking up the "trace" theme from Puzzle 7, a couple of solvers noted that the trace of the matrix representing the grid is 314, and some imaginatively interpreted this number as evoking π and by extension, traditional Christmas "pies" containing partridges and other game birds – very creative!
- Adding to the S=73 numerology (from Puzzle 2), the letters A+P+T sum to 37, which is 73 backwards, and coincidentally, *Hi-de-Hi!* star Su Pollard once appeared on an episode of the UK children's TV show *No. 73* (see here).
- Finally, while many solvers recognised 2025 as a square-number year, one noted that Pope Francis (a callback to the Pope theme of Puzzle 8) was born in $1936 = 44^2$ and passed away in $2025 = 45^2$ (see here).

Puzzle 13: W.I.T.S. [6 points]

(The solution has 8 letters.)

The values shown below are the 1000th, 2000th, 3000th, ..., 8000th terms of a mathematical sequence with a festive flavour – but with an extra digit inserted into each number.

Identify the original sequence. What do the eight extra digits give you?

896068161

4323275793

10718244581

21041844233

34651654733

51747300337

72863525853

97631567493

(Hint: The first three terms in the original sequence are all 2-digit integers – one of them being S, the number mentioned in Puzzle 2 – and the next six terms are all 3-digit integers.)

PUZZLE 13 SOLUTION

The sequence in question is the **Star Primes** (also known as Prime Star Numbers).

The full sequence of Star Numbers (see here) is defined by the formula $6n(n-1) + 1$ (OEIS sequence A003154 – see here), and the sequence of Star Primes consists of the Star Numbers that are also prime (OEIS sequence A083577 – see here). The *"festive flavour"* comment is a nod to **stars being closely associated with Christmas** (e.g., the Star of Bethlehem and tree-toppers), and the **six-pointed stars** in this puzzle echo the **six points available** for correctly solving it. In addition, star numbers are also known as **"centred 12-gonal"** numbers (see here), providing a thematic link to ***The Twelve Days of Christmas*** (Puzzles 4 and 12).

The sequence of Star Primes begins **13, 37, 73, 181, 337, 433, 541, 661, 937…**, which matches the description given in the hint: the first three terms are 2-digit integers (including the special number **S=73**, which was identified in Puzzle 2), and the next six are 3-digit integers.

Solvers needed to calculate the 1000th, 2000th, ..., 8000th terms of this sequence and compare them to the numbers provided in the puzzle to identify the single extra digit inserted in each case:

Term	Star Prime	Given Number	Extra digit	Letter
1000th	**89606161**	**896068161**	**8**	**H**
2000th	**432327793**	**4323275793**	**5**	**E**
3000th	**1078244581**	**10718244581**	**1**	**A**
4000th	**2101844233**	**21041844233**	**4**	**D**
5000th	**3465654733**	**34651654733**	**1**	**A**
6000th	**5174700337**	**51747300337**	**3**	**C**
7000th	**7263525853**	**72863525853**	**8**	**H**
8000th	**9763167493**	**97631567493**	**5**	**E**

Converting the extracted digits to letters using the standard A1Z26 mapping spells out the solution: **HEADACHE**. (Many solvers noted that this was a fitting description of their state of mind upon reaching the final puzzle!)

The puzzle title, *W.I.T.S.*, is an acronym for ***WRITTEN IN THE STARS*** – a clue to the puzzle's mechanism, as the extra digits are written within the stars (i.e. star numbers). In addition, as noted earlier, the Puzzle 6 word list contains a hidden clue: the first letters of the answers starting from 13 (the current puzzle number) spell out **"HINT: STARS"**. Congratulations to the solvers who spotted this.

Regarding the special number **S=73** that has featured throughout the puzzle set, **both 73 and its "mirror" 37** (echoing Sheldon's description in *The Big Bang Theory*, noted earlier in Puzzle 2 – see the clip here) appear in the Star Primes sequence. In fact, the first three terms of the Star Primes sequence – and the only two-digit ones – are the **current puzzle number (13),** the **reverse of S (37)**, and **S itself (73)**.

The most noteworthy connections to the numbers 73 / 37 across the puzzle set are summarised below (though eagle-eyed solvers might well have spotted others):

- Puzzle 1: Clue (n) mentions the ***"73rd and final episode"*** of *Game of Thrones*.
- Puzzle 2: The Grady the Cow incident (22 February 1949) and "Twosday" (22 February 2022) occurred exactly **73 years apart**, and the base-10 calculation 22022022 ÷ 22 gives the palindromic answer 1001001, which is **73 in binary** (as highlighted by Sheldon in *TBBT*). Taylor Swift also featured in *Vogue*'s **73 Questions** series.
- Puzzle 3: Arthur Cayley died at the **age of 73**, and Tom Okker (TSO in the puzzle graphic) won the **1973 French Open Doubles**.
- Puzzle 5: The bottom right number in the puzzle graphic, representing Sophie Duker's score, is **173**.
- Puzzle 6: Looking up **37** in the word list gives **JOYFUL**, echoing the meta-solution phrase *JOY TO THE WORLD*.
- Puzzle 7: John McClane has **73 on-screen kills** across the *Die Hard* franchise, and **RUN-DMC sums to 73** under the A1Z26 mapping.
- Puzzle 10: Both Conway and Stoppard were **born in the year 1937**.
- Puzzle 11: The number representing SYMBOLIC has exactly **73 decimal digits**, and the strings "73" and "37" appear several times within the various numbers.
- Puzzle 12: The word **APT sums to 37** under the A1Z26 mapping, Su Pollard of *Hi-de-Hi!* appeared as a guest on the show ***No. 73***, and the puppets of the Canadian John Conway (not the mathematician) first appeared **73 years ago**.
- Puzzle 13: Both **73 and its reverse, 37, are two-digit Star Primes**, and the 6000th Star Prime (5174700337) ends in **37**.
- Finally, as some solvers whimsically noted, the word **QUIZ** (17+21+9+26=73) and the name **PAULDEN** (16+1+21+12+4+5+14=73) both **sum to 73** under the A1Z26 mapping.

In terms of additional connections and observations:

- A few solvers connected the solution, HEADACHE, to the vintage board game of the same name, noting that the board features a star-shaped central region (see here), while others noted that a headache might result in "seeing stars".

- A star appears on the central bauble on the front cover of the puzzle document (representing "Esther", as noted in Puzzle 3), providing a further connection to the theme.
- One solver noted that Kate Bush's album *Hounds of Love* (featuring her hit *Running Up That Hill*, referenced in Puzzle 9) was launched at the London Planetarium (see here), providing another star-based link.
- Some solvers noted that the puzzle shares its title with the 1925 silent film *Written In The Stars*, which turned 100 years old in 2025 (see here).
- While *WRITTEN IN THE STARS* was the intended reading of the title, a few solvers offered other interpretations, such as "What is this Sequence?" or "Where is the Star?". Others observed that "*W.I.T.S.*" evokes the reasoning skills needed to tackle the puzzle set, and suggested that the idiom *"at one's wits' end"* (see here) aptly captures the feeling of reaching its final challenge!

The Xmas Puzzles 2025 were created and edited by the TXP Quizmaster, Dr Tim Paulden. Many thanks to all those who participated in this year's competition!