

The Bridgian Herald

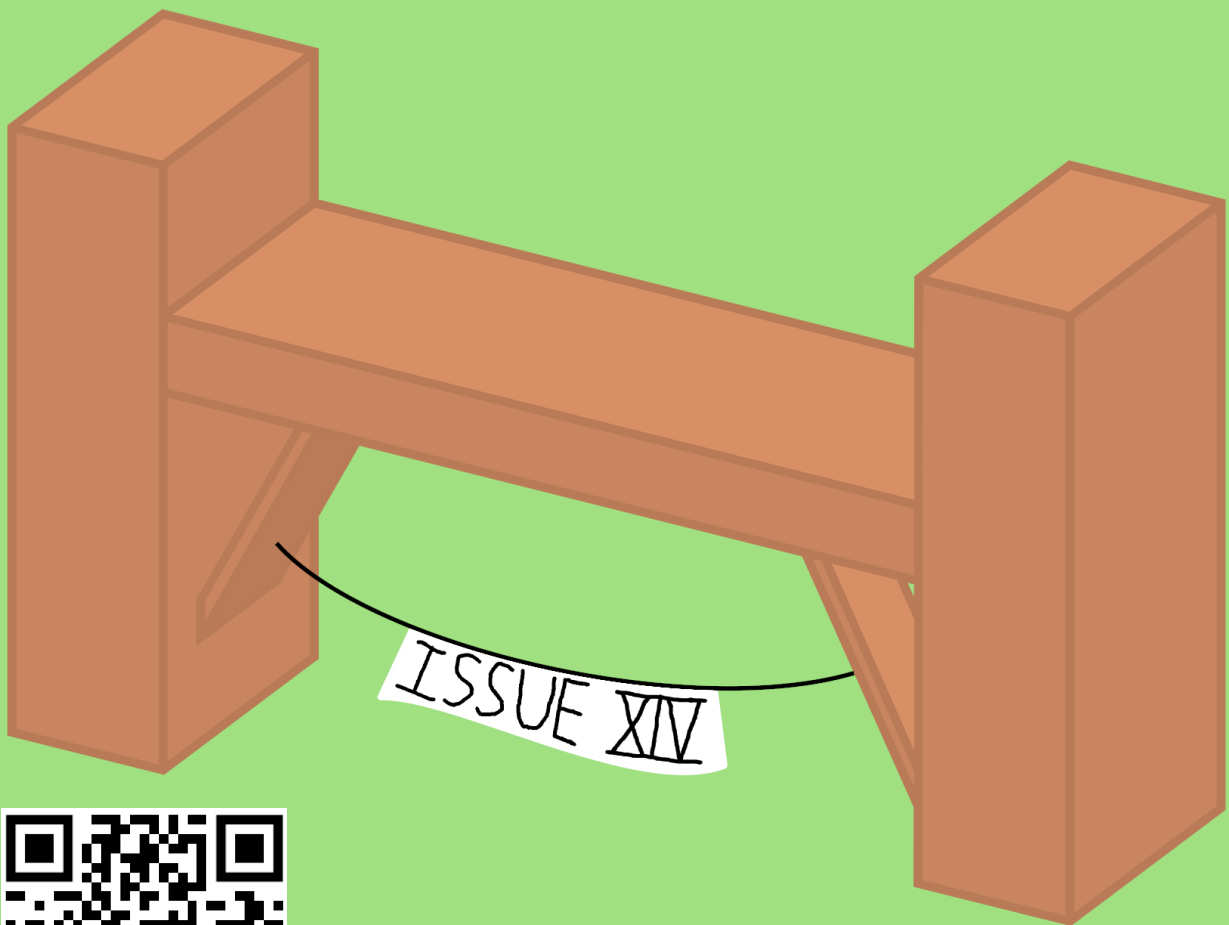
24th February–24th March 2026

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The *Bridgian Herald*

Initiated in November 2024 by the Bridge Base Foundation to ‘improve social cohesion and understanding in the School through the collectivisation of information.’ *Bísbbeis taná!*

Whilst measures have been taken to ensure the accuracy of the content, it is possible that errors or omissions have been made. Feedback would be greatly appreciated to enhance the *Herald* for all.

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Bridgian News

A recessive cycle

“Radio silence” at the Base

THE PERIOD following the Great October Collapse (GOC) is widely considered to be the worst for Bridge Base. This was when the Base had all its construction materials stolen, with no clear way to reclaim them. Between the 14th of October and the 4th of November, only one member held the stand: the Devious One.

The recovery was long, with the Devious One first setting up a secure location – Bridgehaven – with less risk of raids, then sneakily “acquiring” wooden planks and pallets from nearby Seldeth. It took months for membership to reach adequate levels again, with the erection of the Bridgehaven Treehouse. Some argue that the Base only truly recovered in the chaotic, but sophisticated, days in Base β , with the tarpaulins and Front Tyre Wall.

These phases of low membership or activity tend to come periodically, every three months or so, which makes sense. If Bridge Base is or appears to be too powerful, then parties such as the *Group* or *Beryl* will side against it, directly contributing to its demise. Also, an overexpanded Base often leads to infighting, which is unlikely to occur with fewer members. There is a constant oscillation between high and low activity, and this is borne out in the records of the *Bridge Base Log*. November had low membership, but things improved in January, then faltered in February, only to improve in April.

Since the Base’s economy was centred around membership and construction, these times of low activity could reasonably be termed “recessions”. The original, physical arm of the Foundation – the Construction division – has been fully defunct for almost a year, ever since the *Group* destroyed Base κ . The main part of the Foundation has since been the Media division, responsible for such works as the School Maps. Yet it has fallen behind of late.

Work on the maps for *Risk: Interplanetary Edition* (see page 5), which was running at a good clip in January, seems to have halted. Playtesting which should have occurred over the holidays has been left undone. The *Herald* has continued, but reluctantly – remember, the Devious One was the sole holdout in the GOC. Bridge Base is in recession.

The social state of the Base has been shifting, too. Since half the members departed in July, the majority of interactions occur online. Previously, it was a rare day where there was no after-school call between the Bridgians; recently, it has become the *status quo*. This has implications for the long-term integrity of the Foundation, which may end up being split in two. The half still at the School will continue to convene, albeit in Entêkaí instead of any base. The other members, meanwhile, will form smaller, fragmentary groups, separate from and possibly replacing the identity of Bridge Base.

Nevertheless, as the song *Planks A’ Crashing* tells us, Bridge Base shall always endure. No matter what happens today, the members’ resilience must prevail, and the Foundation will recover its former strength. See the three-month cycle of activity? It implies an epoch of prosperity to follow recession. That, if anything, must be worth persisting for. ■

Guarding the news

During the development of the last *Herald*-issue, the Foundation’s Head Guard opined that Issues 13 and 14 should be cancelled, pending a “restart of Bridge Base in March”. Evidently, this request was not followed; the Devious One concluded that pausing releases would set a poor precedent – and, considering that Issue 13 was the second-longest, a lack of Bridgian news was no obstacle to success.

Whether the Head Guard’s plan will go ahead is another question. It has the potential to reignite the Foundation, ushering a new era of Bridgianity into existence. The triumph of the Domebush Era (Late- κ) elucidated this ability of the Guard. But such people are known to make grand promises with no plans for their delivery. Issue 15 will report on the progress towards the return of Bridge Base, which could range from nonexistence to complete Base β -level bustle. We can only wait and see.

School News

Notice me!

A paradigm shift is needed

STAIR QUARTER

COMMUNICATION. One of the main drivers of success in any society. The Bridgians tried getting away without it, but ended up creating utter chaos which nearly destroyed the whole Base. The ensuing policies were a last-ditch attempt to ingrain some degree of coordination between members. It failed. Gilnar Base, or Base β , was demolished by the *Group*, partly as a result.

The issue of poor communication also seems to affect the students, and particularly knowledge of upcoming events and activities. Recently, the electronic noticeboard in Stair Quarter, Rintae, has been following the “Cringus rr ” trend of malfunctioning, variously showing a blank screen, the Windows 11 lock screen, and a computer interface with an empty presentation open in PowerPoint.

This is the least of its issues. The noticeboard, in its current form, is fundamentally flawed. Who thought it was a good idea to have twenty slides, each with information of differing importance, flash up for ten seconds at a time? By the time one starts to read the slide, it disappears, and nobody is going to wait the few minutes for it to reappear.

The main issue is the mixing of “static” and “dynamic” slides. Static slides are those which stay largely the same for long periods of time, and thus confer little information once they have been read once. Dynamic slides are those which change frequently, and are most suited for the electronic board. Solution: transfer the static slides to the physical noticeboard and condense the dynamics.

Or not. Even then, many students are not going to read the board. But if they do not actively seek information, then how do they expect to get it? That cannot be helped. The others’ pain can be: by optimising the noticeboard for its best use. ■

Inteidthen bei

On the benefits of sustainability

IT WAS a busy morning, to say the least. And one that changed the School’s landscape forever. On the morning of the 23rd of February, your correspondent watched heavy machinery lug logs around like feathers – and there were plenty of logs to go around. Three trees, in all, were felled, as well as many large branches. Looks like Nærór all over again, with no merciful Reposes in sight.

Your correspondent’s first thought was, *How will this impact the School Map?* Hastily jotting the affected areas down yielded no surprises. Despite its name, the Æternus Tree was known to be in poor condition, and had already gained a belt of tape a few months prior. Its removal was expected. This, of course, produced a heap of wood-chips in the process, which were mostly piled, as before, in the Farferns. (Some ended up in Base γ , creating a mound in the southern entrance. They are a few years late to help fortify the Beryllians, though.)

The biggest change, though, was the razing of Shedby Base. The grove by the playground had developed structural instabilities over time, which were visible as branches detached only to be caught by other branches. The tangled mess was posing a hazard to passers-by – and there are plenty of those around – so the decision was made to sever half of Base σ . At present, it looks peculiar, like one has gained x-ray vision to glimpse the forest behind.

Some students are already complaining about the effect this has, and that is a valid concern, but what is the alternative? Leave the branches to fall on people or damage the playground? Sure, it may be funny, but it would also be a pain to clear up. And this would keep happening, until Base σ is cut back. There is a reason why the “tree surgeons” are regularly sent in: to combat these very effects.

To say “just leave the trees” is a wholly short-sighted viewpoint. The trees would fall anyway (just look at the Twin Trees, or Bridgehaven, if that helps); we are simply doing it in a controlled, safe manner. If you wish to argue against that, by all means do, but you will find it difficult. Although there is one case where “just leave the trees” is right.

The fallacious plot

Base ϕ . 20th June 2025. Mid-afternoon. Reports arrive of three men rashly hacking at the boughs of Climber's Tree. At the time, Base ϕ , or Climber's Base, on the right when approaching the car park, was the *de facto* headquarters for the Bridge Base Foundation. Recently, its members had heard rumours, from within the *Group*, of plans to cut the branches off their Tree. Knowing Entékaí well, the Bridgians hedged their bets, using Base ϕ for habitation but moving all valuables to Base τ , in the forest behind. Usually, such threats pass safely, but this was not the usual. It was happening, now.

The *Group* thought their plan to be genius. Crush Bridge Base by thwarting access to their favourite activity: climbing trees. With nowhere to go, the Bridgians will surely disband, removing the foul presence once and for all. It did not work. Far from crushing the Base, this put them resolutely against one another. And, thanks to a branch that was 'too big to be chopped' – the *Repose* – the Bridgians could simply climb to the upper portion of the Tree which was not cut back. Hurrah!

They also found other trees that were easier to scale. Base μ , a pair of trees adjacent to the car park, was a popular spot for years, with thick, flat limbs that gave more emphasis to the radial dimension. In theory, the *Group* disagreed with this site as it was outside the Road (so violated their ridiculous "Senkaí law"), but, in practice, nothing was done. Bases μ and τ , even further out, became the operational locations for the Foundation, facilitating *en masse* raids, tree-climbing, and hiding in the forest.

Far from curbing Bridgian activity, the severing of branches made the Foundation stronger, as it cemented their case against traditional authority. When asked about their mad antics, the men said they were making the School 'safer for all'. By removing the safe way up the tree? That is hopeful, to put it lightly. In fact, this paradoxical judgement exemplified a trope found across Bridgian history.

The "Nærór fallacy", named after the region in which Base ϕ is located, is the idea that measures to curb a specific Bridgian activity will reduce the overall strength of Bridge Base, rather than simply causing new activities to emerge. The *Group* keeps playing an eternal game of whack-a-mole which brings it no benefit, all because of this false belief.

Catabiosis

Back to the present (or, rather, the day before this *Herald* goes to print). The School keeps removing trees, understandably enough, as all living things eventually die. But consider the limit to infinity. Ephkaí is converted into a plain, barren field. All the bushes have died; all the trees have fallen; all that is left is grass, with the odd patch of mud. Why is everywhere not like this? Trees naturally spread seeds which can synthesise new life from the old. However, this is a very slow process – and one that is not helped by all the students running around on the field. How can we replicate this?

To keep the School in equilibrium, one would presume that, for every tree chopped down, a new tree should be planted – not in the same place, necessarily, but somewhere within the grounds. Really, because most saplings fail to grow far, we should plant multiple trees to give the best chance of a survivor. Perhaps, as part of horticulture, the *Group* could commission a student-run orchard – or is your correspondent going a bit over the top?

Whatever happens to Ephkaí in the future, it should include sustainability in its objectives. We as students should promote this, for the benefit of all who come after us. It is about more than just trees, too. Consideration for the future, whether environmental or otherwise, is a key tenet of long-term, rational management and our stewardship of this planet. And if the School listens, maybe we will return and see a flourishing field once more.

Your correspondent is not here to complain about some random trees being chopped down. That is a perfectly normal and healthy thing for an ecosystem to go through, clearing the ground for new life. The safety aspect is how it is justified, but its benefits are far greater than that alone would grant. But take the warning about removing trees for good. The School will pay the price for it, in the long run. Long-term thinking provides a solution.

Next time that you see grounds maintenance around, have a think about what they are doing. Why are they doing this? How does it impact you? You might realise that – despite the disturbance that hewing branches or mowing grass gives – it benefits the School in quite a few ways. After all, they would never waste their time coming here for no reason, right? We shall see about that. ■

Guides

Astroludology

The logic of 5 > 1 wins again

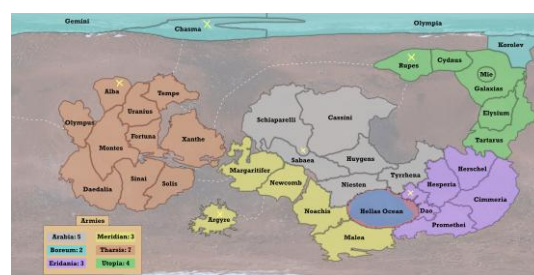
SOME CALLED IT “procrastination”. Others, “time-wasting”. A few even described the work as “unnecessary”, believing it unlikely to ever succeed in its goal. This was indicative of a futile view, for the mission was availed to pedantic completeness. Never underestimate Bridge Base.

In mid-January, a group of Bridgian members began discussing the potential for improving the board-game *Risk* (which they had been playing at the School in the mornings), with an emphasis on expanding over multiple boards. A multitude of ideas were mooted, but the leading proposal was boards for different celestial bodies – in a reality where humanity has spread itself across the solar system, but somehow still uses horses in warfare.

The Devious One, naturally, became excited at the idea of designing maps. He was supposed to be continuing work on his interactive School Map, but decided that this was far more pressing. Even though he has never actually played a game of *Risk* before. He was invited to an online “server” where he saw two concepts for Luna (a.k.a. the Moon), both centred around the lore of mining outposts and rival colonies comprising each continent.

Not wanting to interfere, the Devious One decided to break ground on Mars’s map. The first hurdle was acquiring a template to begin with: he needed a rectangular map of the whole planet, with enough detail to see small planets. America’s National Aeronautics and Space Administration (NASA) makes this freely available – at a resolution that turns the average computer into a jet engine. It took ten minutes to downscale the file to a more manageable size, from 8 billion to only 130 million pixels, so the map could be drawn over it. (Maybe think twice before downloading high-resolution satellite imagery of an entire planet. Or not.)

Then he traced key geographic features for the borders of regions and continents, stored as vector “paths” in GIMP (the same photo-editor that was used for the School Map). The paths needed to be as detailed as possible, if only to make them look more convincing; this was a design choice, not a necessity, as we shall see later. They were then filled in and drawn as different layers to create the image below. This took a total of four days to produce, largely owing to the Devious One’s poor focus on the project. But it was complete, nonetheless.



The Bridgian version of—oob, look at the enclave...

The Devious One aimed to make the map as geographically accurate as possible. Borders were, for the most part, justified by ridges, craters, or other terrain features that were visible on the map; however, much of it was arbitrary. The only real, obvious continent on Mars is Tharsis (red above), a volcanic region which hosts the highest point on the planet, Olympus Mons. The others are, sadly, not as clear-cut, being mostly unremarkable areas joined together as the map’s designer saw fit.

Going interplanetary

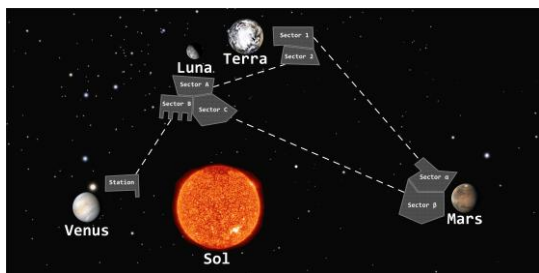
Yet to be fleshed out was the system for armies to move between planets. ‘x’-symbols were placed on certain territories to represent “spaceports”. Each spaceport, it was originally assumed, would allow transfer to a subset of other spaceports – e.g., each spaceport could be assigned a colour so armies can only move between spaceports of the same colour.

The leading suggestion, though, was to use the continent’s colour: spaceports on Mars’s “red” continent would link to those on the Moon’s “red” continent, and likewise for the other colours. Hence, it was decided that, for safety’s sake, each map should have six continents (like the original *Risk* map) with one spaceport per continent. If the Bridgians changed their minds, no harm would be done, so it may as well accommodate the scheme.

After a long discussion on the online server, the Bridgians decided to change their mind. They wanted control over space to be of more strategic importance, rather than planets being connected directly. The main issue, at present, was that an army on one planet could easily attack another planet with no warning, as connected spaceports acted identically to a border between territories. The Devious One initially suggested that, to make the planets more separate, moving armies through space could incur a one- or two-troop fee, but this was rejected as it failed to solve the original issue.

In the end, it was resolved that there would be space stations orbiting over each planet, which the spaceports would enable access to. Armies transfer between planets via three steps: firstly, move up to the starting planet’s space station (from a territory with a spaceport); secondly, transfer between space stations on the “overview map”; thirdly, descend to any spaceport on the destination planet’s surface. Controlling a space station, therefore, is critical to maintaining a strong presence on its planet – and *vice versa*, as the station is the first target for attack, and must be shored up from the planet below.

The overview map was actually made last, but detailing its development (finding good images of planets to plaster over the south pole’s night sky, then drawing stations like other territories) would be pointless, so it is provided for reference below.



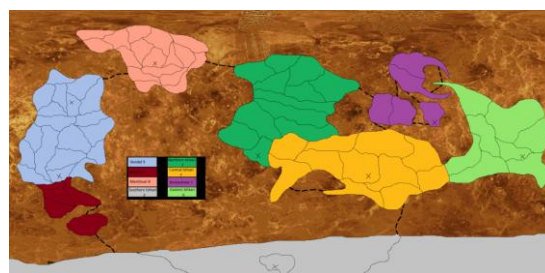
Not to scale.

Each planet’s station was divided into sectors, with one for each connection to another planet. This made it harder for one player to take and hold an entire space station, as they must defend on up to three fronts, plus attacks from the planet itself. Troops can move between any spaceport and any sector on the station, so they can pick the weakest army to attack. Additionally, occupying the space station facilitates the rapid movement of pieces across a planet, so the potential reward is immense.

Not just the Devious One

When the Devious One started his Mars map, he fully expected that the others would work on the other planets (or the Moon, at the very least), and have at least one done before him. This was optimistic, to say the least. The server went completely quiet after a day or so; fellow Bridgians were more occupied by other tasks. However, the completion of Mars galvanised further progress, starting with the aforementioned discussion about space travel.

Venus was next to be fully mapped. Lacking the Devious One’s eye for detail (read: excessive pedantry), it was made in Microsoft Paint®, an old favourite of his that had a little falling-out over the 2022 School Map, and never quite made up since. A frankly abysmal resolution of 1217×598 (versus 8192×4096 for Mars, halved from the working copy) added to this, but despite the Devious One’s cries, it was accepted. After all, who cares if it looks a bit shoddy? If you can see the territories, you can play on it. There is no point obsessing over details.



This certainly fits the aim of Risk: Interplanetary Edition – 80 territories between eight continents!

Note that the requirement for “six continents, one spaceport per continent” had been dropped by this time. This allowed spaceports to be placed strategically, making player experience more varied and interesting. It also allowed more territories to fit onto the board, although their diminutive size could negatively impact play. (Solution: make the board bigger.) Adding to this is the lack of names for individual territories, which would ordinarily limit their smallness. Some would call this lazy, but we prefer to call it “reducing clutter on the map”.

These are easy issues to fix. At worst, Venus could be reorganised to make the territories bigger, for example, by utilising more of the empty space on the map. Names are not essential; indices could be allocated instead – these are needed for the cards that assign territories at the start of the game.

Microsoft Paint®, season 2

At first, it was presumed that Earth would use the original *Risk* map. However, it was soon realised that it would not be up to the task: it was highly unrealistic, had too few territories, and would have to be modified regardless to include spaceports. A certain ex-cartoonist took the charge ('Shall I do it as I haven't done one yet?' were the exact words) and began tracing lines on a political map of the Earth. A topographical map would probably have been better, as this imaginary future would not leave countries as they were in the 21st century.

The style of the map was outwardly clear and uncluttered. Borders were composed entirely of straight lines, giving them a digital, futuristic look whilst also enhancing readability. Labels were set entirely in lowercase and block colours were used throughout. It was, undeniably, efficient design.

Given the object of "realism" in development, one may question the lack of any satellite imagery. All the others used it as a background, whereas the Earth is... a black sheet? But, like the sloppiness of Venus, ignoring the background does not impinge on playability. In fact, because the unfilled areas are entirely ocean, it would make almost no difference. The block-colour solution is consistent with the rest of the design, so why not keep that? Exactly.



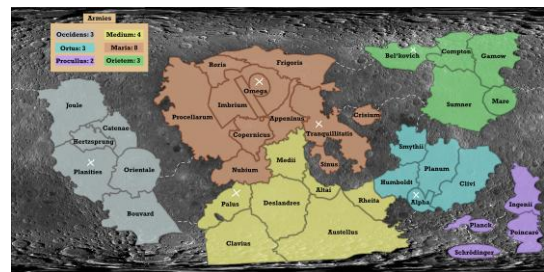
It certainly gains points for simplicity.

Meanwhile, the same designer was working on a program that could automatically determine the result of a battle between armies, dubbed the *Risk Autobattler*. It ran on the BBC Micro:bit, where a user must input the relevant numbers of attacking and defending troops. The dice-rolls are simulated to find the victor and the armies that remain on the territory. Thence the cycle repeats; the Micro:bit accepts another pair of inputs from the user, works out the winner, *et cetera*. v1 of the *Autobattler* only did one battle, but the Devious One did a "quick" (obsessive) rewrite to produce the multi-battle v2.

A few may complain: "But is rolling dice not part of the game? This *Autobattler* will ruin it!" Not when you would have to roll a thousand times during a game; then, it gets utterly tedious and any cure for that is worth the cost. A marginally more valid concern is that of a rigged *Autobattler* – *i.e.*, one that favours one side over another, or where the designer can exploit a backdoor to guarantee a win. To mitigate this possibility, the code for the *Autobattler* is released openly on the server, so any doubtful players can check through it if they wish.

Et luna nota

The last celestial map came easily. The Devious One simply repeated the procedure for designing Mars, just on the Moon. Literally, the colours were the same, the "Armies" box was simply moved; the only differences are the borders, the names, and the background. Six continents with six spaceports (albeit not one per continent: the dark "maria" have two, whilst the far-side craters have none), but 38 rather than 36 territories. That a much smaller body should have more regions is odd, but hardly the strangest part of *Risk: Interplanetary Edition*.



Does this look at all familiar?

The Devious One then set about printing one of the maps – Luna, as it turned out – to show the other, actual, *Risk*-players. Four sheets of A4 paper, laminated and then taped together to form a small board, which, according to feedback, 'would have difficulty fitting more than three pieces onto each territory.' As we are considering adding a 50-troop piece, this does not bode well. (In the worst case, 49 troops would require nine pieces: four 10s, one 5, and four singular soldiers. Still not very good.)

The present plan is to play *Risk* online for now, with the custom maps, to ensure that all the new mechanics work smoothly, and to make revisions quick to implement. The physical maps can wait. *Risk: Interplanetary Edition* is here anyway. ■

Bishbeis-sa Angein

The “final” changes to anglicised form

OFTEN, THE BEST solution is the simplest one. It is less susceptible to going wrong, easier to implement, and – crucially for this story – generally readier to be understood. You see, the Devious One had been grappling with the “anglicised form” of Bridgian Phonetics, which aims to make his weird, overcomplicated language easier to read. It seemed impossible to achieve this without adding billions of edge-cases, which then negate the original purpose of anglicised form.

To explain, Bridgian Phonetics is a system for expressing sounds that evolved from the Devious One’s efforts in coming up with unpronounceable place-names. (‘Likhām’, ‘Trodae’, and ‘Zétisle’ are the first that spring to mind.) He needed a way of writing how to say them, so he used symbols for each sound, which eventually turned into modern Phonetics. Phonetics gained a life of its own when it was used as the basis for the Bridgian language, an overly arcane thing that ends up plastered across *Bishbeis-sau* in a completely uncontrolled manner.

Phonetics uses 26 letters (or, in syllabic form, glyphs) that each represent a different sound. For instance, *a* represents the ‘a’ in ‘trap’, and *s* is the ‘s’ in ‘sap’. Letters can also be accented, and these indicate long vowels or voiced consonants: *á* is the long ‘a’ in ‘pan’, and *ś* is the ‘z’ in ‘zap’. This leads to a total of 43 sounds able to be made in Bridgian; twenty vowels and twenty-three consonants.

Traditional form, as this one-letter-per-sound arrangement is known, is able to express all the sounds used in English with minimal ambiguity. Or, *Dhpædicænəl vóm, ás þis won-ledhə-bhó-sawnd æpeyndémændh ís nəwn, ís eybəl dhw e’gəbpes ól þó sawnds yúsd in Iəglíc wíp’miniməl ambigywídhý.*

Hopefully, that illustrated the problem. Who on Earth can be expected to read that? Even worse, look at the *tour de force* of Phonetics, syllabic form:

Clearly, a “human-readable” version of this writing is required. Why does ‘traditional’ have to change so wildly into *dhpædicænəl*? Well, in short, English is a mess. How a word is spelled has little effect on how it is pronounced. Obviously, we as humans convert between these without thought, by reading out or transcribing words. But inconsistency is impossible to rectify with the set rules of conversion between forms of Bridgian Phonetics.

The first version of anglicised form was barely any better than traditional form. The only changes it made was to vowels, with *w* (the ‘oo’ in ‘goose’) becoming *ú*, *ey* (‘face’) becoming *é*, *et cetera*, and to the aspirates *bh* (*p*), *dh* (*t*), and *gh* (*k*). Already, this turns ‘traditional’ into *trædicænəl* – first two letters correct, still the rest to work on. Upon realising the utter failure of anglicised form to meet its purpose, the Devious One made it ever more complicated.

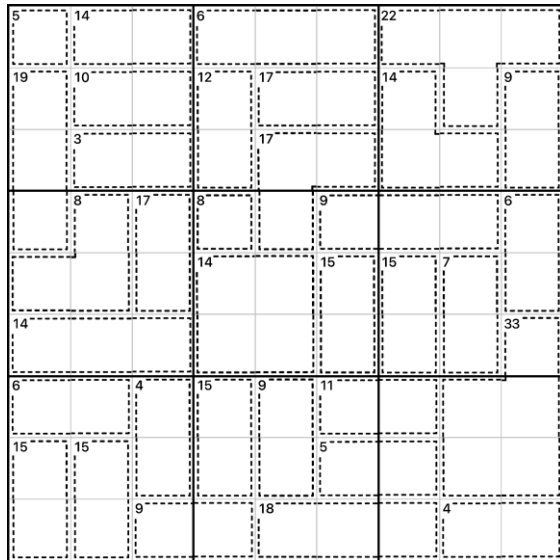
By mid-2025, anglicised form had amassed over a hundred “replacement rules”, each catering to a certain quirk of English. *Trùdishùnùl* was the new translation – almost readable! (Tangent: in the actual Translator program, an apostrophe was added to *T’r...*, because it was designed for a subtly different accent, where ‘traditional’ starts with a ‘ch’ sound, rather than ‘t’. *dcp* was replaced with ‘tr’, whereas *dhp* became ‘t’r’ to avoid ambiguity. New anglicised form assumes a ‘t’ start instead.)

Contrast this with, say, transliterating a Greek word into English. For instance, *γέφυρα* (‘bridge’). In this case, each letter would be replaced with its Latin equivalent one-by-one. So, *γ* becomes ‘g’, *έ* becomes ‘e’, *φ* becomes ‘ph’, and the result is *gēphýra*. Note that this gives a guide to the spelling, not the pronunciation of the word. That would be taking [jɛfɪrɐ] and trying to somehow mangle it into English – which has no equivalents for the Greek phonemes [j], [ɛ], or [ɐ]. Sounds difficult.

That latter path is what the Devious One was trying to do with Bridgian this whole time. And it will, simply, never work. Using normal transliteration methods is simpler and more effective. Letters are changed one-by-one now, so ‘traditional’ becomes... N/A? Aye, the new anglicised form only works for the 24 sounds actually used in Bridgian, so *Bycbeys* (‘Bridge Base’) becomes *Bishbeis*, but *dhpædicænəl* will stay traditional forever. Expect an update when the other 19 sounds are added. ▀

Activities

Killer Sudoku



Instructions

Fill each square with a digit from 1–9, such that the squares within each dashed cage add up to their respective total in the top-left. No digit may be repeated in a row, column, cage, or 3×3 box. The puzzle is completed when there is a digit in all cells. There is only one solution given the initial clues.

Hypogram



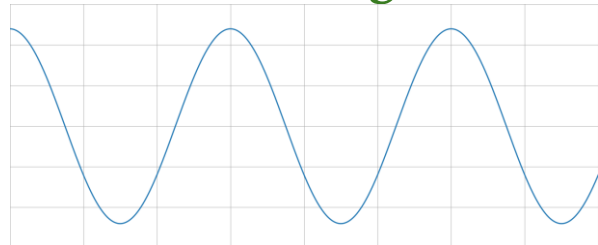
Instructions

Find as many words as possible using some or all the letters above in any order, excluding contractions, abbreviations, proper nouns, plurals, and adverbs ending in ‘-ly’. Letters may not be repeated unless they appear multiple times above.

Last issue’s answers

I, O, gi, go, in, né, no, oi, on, or, ego, eon, gin, ion, ire, neg, nog, nor, ergo, girn, goer, gone, gore, grin, intro, iron, nero, noir, nori, ogre, oner, goner, groin, irone, reign, ignore, region.

Maths Challenge



An alternating-current (AC) electrical supply is connected in parallel with a 10 W filament lamp and an oscilloscope, assumed to have infinite resistance. The display on the oscilloscope is shown in figure above.

Level 1 (easy)

The time base – *i.e.*, the width of each square – is set to 0.005 seconds per division. Calculate the period, and hence the frequency, of the AC supply.

Level 2 (medium)

The peak voltage of the supply is set to 12 V. Estimate the *y*-scale (height of each square) on the oscilloscope.

Level 3 (hard)

Plot voltage squared over time and hence suggest a formula for mean power (in a DC circuit, $P = V^2/R$). Use this to compute the resistance of the bulb.

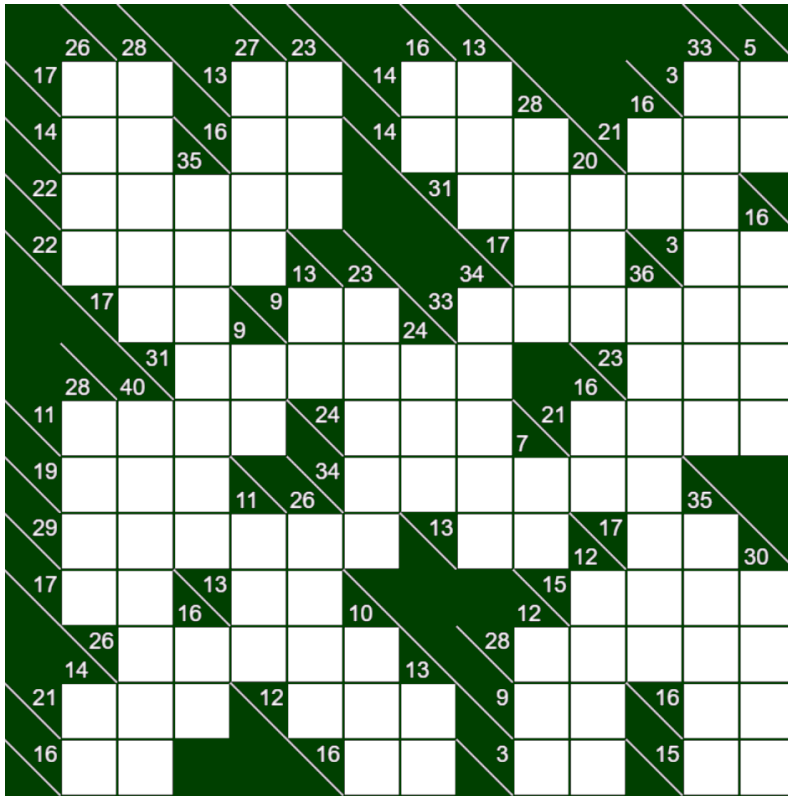
Level 4 (extreme)

The power radiated from a “black-body emitter” is given by $P = \sigma AT^4$, where the temperature T is quoted in kelvin. Assuming a cylindrical filament of radius 100 μm and length 5 mm, find the temperature of the filament when operating at equilibrium. (The Stefan-Boltzmann constant, $\sigma = 5.67 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$.)

Solutions to all previous Maths Challenges can be read on the Foundation’s website, accessible via the QR-code opposite.



Kakuro

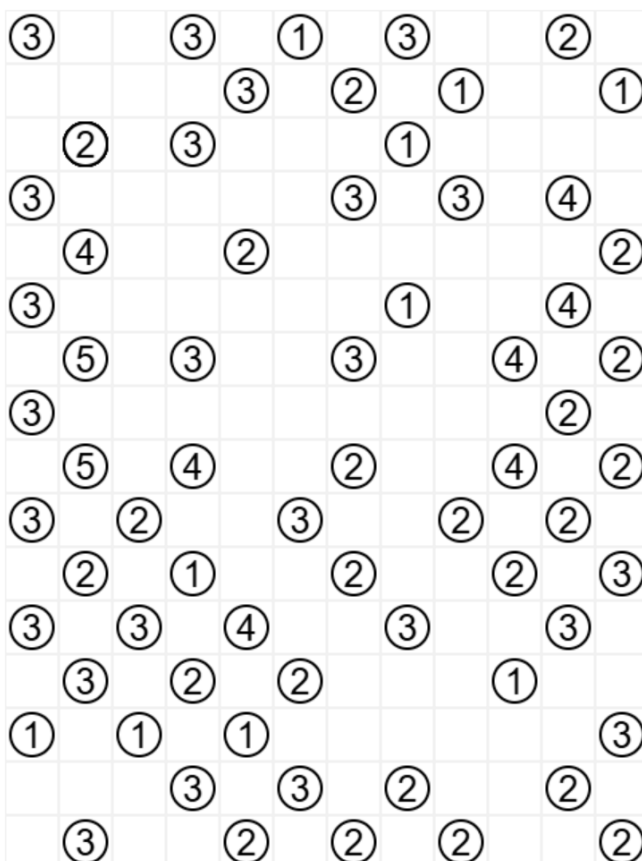


Instructions

Fill all squares in the grid with the digits 1–9, such that horizontal and vertical runs add up to their respective totals in the top or left. No digit may be repeated in an unbroken column or row.

The puzzle is considered complete when every square has a number in it, and all the above conditions are satisfied. This should be reached with a logical approach to maximise the chance of success.

Hashiwokakero



Instructions

Connect the ringed cells by bridges such that each cell has the indicated number of bridges connected to it. Bridges may only be horizontal or vertical, and cannot bend, cross another bridge, or pass over ringed cells. Cells can also be linked by double bridges (drawn as parallel lines), which count as 2 for the cells they connect.

The puzzle is considered complete when all cells have their requisite quantities of bridges connected (but no more), and the cells are linked by a single network of bridges – no disconnected islands allowed.