

**MATHS  
WI  
NAE  
BORDERS**

**This mini-competition is inspired by the annual ‘Mathématiques sans Frontières’ contest. ‘Maths wi nae Borders’ can be entered by *any* class in Scotland. The five tasks should be completed in less than two hours. Entries should be submitted online and must be received by 10<sup>th</sup> October 2025.**

**To enter**

- Head to [www.mathsweek.scot/schools/challenges](http://www.mathsweek.scot/schools/challenges)
- Select Maths Wi Nae Borders
- Fill out the form
- Upload your files to the form following the instructions
- Await your certificates and keep your fingers crossed you win!

**Some advice from the markers, based on previous competitions:**

- Partial solutions and attempts can gain marks.
- Neat and careful work is important
- Remember that we are looking for entries from an entire class (so as a class pick your best solution to each of the five problems).
- Many entries will include correct answers so consider how to make your entry stand out (an excellent answer might include a description of how you approached the question, any extra formulae or strategies you came across or any observations that you think are Mathematically interesting).

①

Dougal has a pack of 32 cards - all of them are different with a whole number from 1 to 8 and with a purple, red, yellow or black design.



In this game, two cards with touching sides must have either the same number or same colour (touching corners don't matter).


Dougal has already placed 13 cards down on the table. Show how Dougal can complete the grid while sticking to the rules of the game.

②

$$\begin{array}{r}
 \text{a b c d e} \\
 \times 7 \\
 \hline
 \text{f g h i j} \\
 \hline
 \end{array}$$

**Every letter in this calculation represents a different digit.**

**Neither of the two numbers begin with a zero.**

**Find which letter from a to j matches to each of the digits from 0 to 9 to make the calculation work.**

**Remember to explain how you got your answer!**

Tha trì tidsearan Matamataig a' bruidhinn mu dheidhinn nan còdan PIN a tha aca air na laptopaichean aca, agus tha iad a' feuchainn ri tuairmsean a thoirt dha chèile gun a bhith a' foillseachadh nan còdaichean dhiomhair aca.

Tha Mgr McArthur ag ràdh, "Tha am PIN agam na iomad de 2, 3 agus 5."

Tha Mrs McBride ag ràdh, "Obh, 's e sin a tha am PIN agamsa cuideachd. Agus nuair a bhios mi a' cur-ris figearan a' PhIN agam, bidh sin a' toirt iomad dhomh de 2, 3 agus 5."

Tha Mgr McCallum ag ràdh, "Jings. An toiseach, tha am PIN agam na iomad de 2, 3 agus 5 cuideachd. A bharrachd air sin, bidh mi a' faighinn iomad de 2, 3 agus 5 nuair a bhios mi a' cur-ris figearan a' PhIN agam còmhla. Agus 's e am PIN agamsa an àireamh as lugha dhen t-seòrsa sin!"

Cò còd PIN a tha aig na tidsearan as urrainn dhut a dh'obrachadh a-mach (agus dè tha ann?) Minich do fhreagairt.



Give your answer to this question in Gaelic or Scots using a minimum of 30 words.

Three maths teachers ur blethering about th' PIN codes oan thair laptops, trying tae gie each ither clues wi'oot revealing thair secret code.

Mr McArthur says "My PIN's a multiple o' 2, 3 'n' 5."

Mrs McBride says "Oh, mah PIN's a multiple o' 2,3 'n' 5 tae. 'n' adding a' th' digits o' mah PIN an' a' gives me a multiple o' 2, 3 'n' 5."

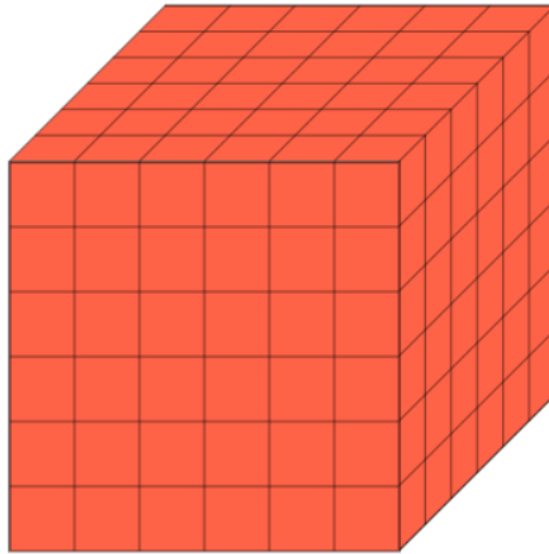
Mr McCallum says "Jings. Furst o' a', mah PIN's a multiple o' 2,3 'n' 5 as weel. Nae jist that, adding a' th' digits o' mah PIN gies me a multiple o' 2, 3 'n' 5 an aw. Bit mah PIN is th' smallest sic number!"

Which teacher's PIN code kin ye wirk oot (and whit is it)? Explain yer answer.



④

**A large cube is made from 216 individual cubes of side 1cm.**

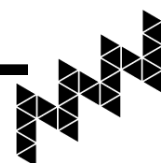


**a) What is the surface area and volume of this shape?**

**Now, you've to make a new shape from the large cube by removing 16 cubes (one by one) each time taking a cube from the outside of whatever shape you have at that moment.**

**b) What is the volume of the new shape? What is the smallest possible surface area of the new shape?**

**Explain how you can be sure of your answer.**





5

Welsh Mathematician Robert Recorde was alive in **1521**. Not only is **1521** a square year ( $39^2$ ) but it also sits nicely in the middle of a trio of equally spaced square numbers:  
**441, 1521, 2601.**



Scottish Mathematician John Napier was alive in the year **1600**. Not only is **1600** a square year ( $40^2$ ) but it also sits nicely in the middle of a trio of equally spaced square numbers:  
**64, 1600, 3136.**



English Mathematician Isaac Newton was alive in the year **1681**. Not only is **1681** a square year ( $41^2$ ) but it also sits nicely in the middle of a trio of equally spaced square numbers:  
**961, 1681, 2401.**



You're a Mathematician alive in the year **2025**. Not only is **2025** a square number ( $45^2$ ) but it also sits nicely in the middle of a trio of equally spaced square numbers:  
**x, 2025, y**



- Work out the values of x and y
- Find a Mathematical symbol that we have Robert Recorde to thank for.
- Find a Mathematical symbol that we have John Napier to thank for.
- Find a Mathematical notation that we have Isaac Newton to thank for.