



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 must be received by 27th October 2021.

To enter

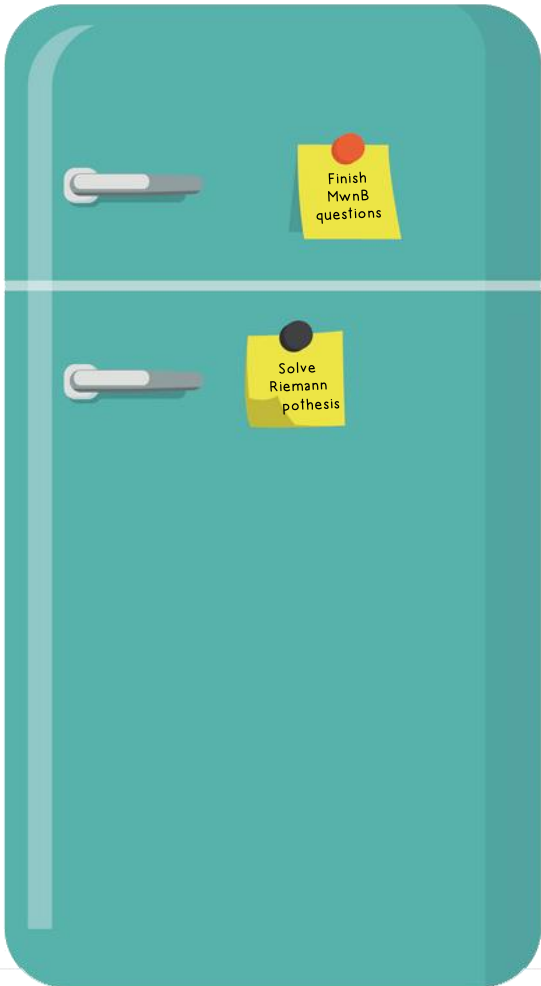
- Head to www.mathsweek.scot/schools/challenges
- Select Maths Wi Nae Borders
- Fill out the form
- Upload your files to the form following the instructions
- Await your certificates and keep your fingers crossed you win!

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).



Jura has stocked her fridge with loads of cans of Irn Broo.



If you take the cans out in twos there will be one left.

If you take the cans out in threes there will be two left.

If you take the cans out in fours there will be three left.

If you take the cans out in fives there will be four left.

If you take the cans out in sixes there will be five left.

If you take the cans out in sevens there will be none left.

What's the smallest number of Irn Broo cans that Jura could have put in the fridge ?



②

Using two positive whole numbers A and B , I've formed a weird calculation that's perfect for this year's competition...

$$\begin{array}{r} A + B \\ + A \times B \\ + A - B \\ \hline 2021 \\ \hline \end{array}$$

If you know A is bigger than B , then what are the values of A and B ?



3

Drew is daein a wee jigsaw. The boax the jigsaw comes in tells Drew that it's wan of thae rectangle-shaped pitchurs and that it hus 1000 pieces. Even tho the pieces are aw slightly diffrent, they're roughly squareish and kinda form a grid o horizontul and verticul lines.

Drew's gie canny when it comes tae jigsaws so to avoid getting in a fankle, he starts with the outside pieces. It's a fouter but he counts them aw and finds thur's bang oan 124 edge pieces, includin the fower corners. Straight away, Drew realises it's impossible for the puzzle to have exactly 1000 pieces (he's no glaikit, after aw). Whit a scunner.

How close tae 1000 pieces could the jigsaw be?
Explain yer answer.



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



Tha Drew a' dèanamh mirean-measgaichte bheag. Tha am bogsa anns a bheil a' mhìrean-measgaichte ag innse dha Drew gur e aon de na deilbh le cumadh ceart-cheàrnach a th' ann agus gu bheil 1000 pìos ann. Ged a tha na pìosan uile rud beag eadar-dhealaichte, tha iad uile le cumadh gu math coltach ri ceàrnag agus tha iad caran a' cruthachadh cliath le loidhnichean còmhnaid agus bheartagail.

'S e rud beag de dh'èolaiche a th' ann an Drew le mirean-measgaichte, mar sin gus stad a chur air fhèin a dhol troimh-chèile, tha e a' tòiseachadh le na pìosan a-muigh. Is e obair dhuilich a th' ann ach tha e a' cunntadh gach pìos agus a' lorg gu bheil 124 pìosan ann airson an taobh a-muigh, a' gabhail a-steach na ceithir còrnairean. Sa bhad, tha Drew ag aithneachadh gu bheil e do-dhèanta gum bi 1000 pìos anns a' mhìrean-measgaichte (tha e gu math glic!). Abair pian!

Dè cho faisg air 1000 pìos a dh'fhaodadh a' mhìrean-measgaichte a bhith? Minich do fhreagairt.

4

Last year wasn't the best!

With so many events cancelled I barely used my 2020 calendar.



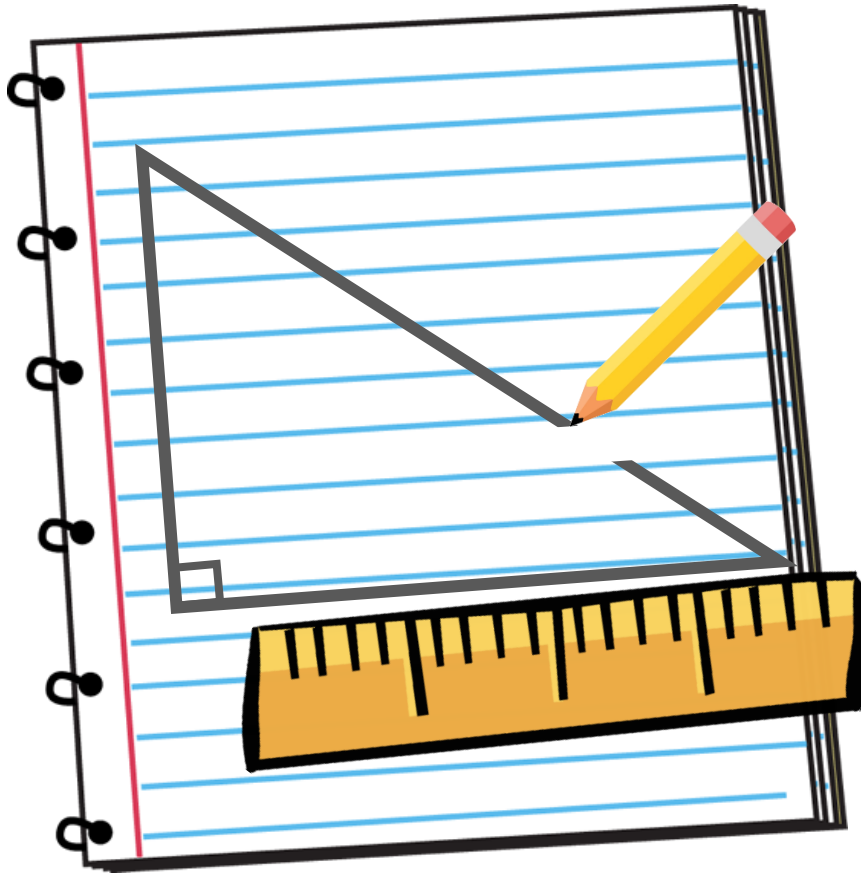
I've decided to keep it in a drawer and re-use it the next year when the dates and days overlap with 2020 calendar.

What's the first year I will be able to re-use the 2020 calendar?

Explain your answer.

5

Draw a right-angled triangle with sides of 6cm, 8cm and 10cm.



Now...show how you can accurately split the entire right-angled triangle like this into just:

- a) two isosceles triangles**
- b) three isosceles triangles**
- c) four isosceles triangles**
- d) five isosceles triangles**
- e) thirteen isosceles triangles**