INVESTIGATIONS

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STAINED GLASS WINDOW

Well-designed mathematical investigations have the potential to engage all students in rich mathematical learning, support them to make connections, and develop their mathematical language and reasoning. This stained glass window investigation is an opportunity for students from Year 2 to Year 6 to explore several important mathematical ideas, including: arrays, square numbers, growing and repeating patterns, and representing these patterns using more formal algebraic notation.

A NEW STAINED GLASS WINDOW FOR YOUR SCHOOL

You have been asked to build a new stained glass window for the front entrance of your school. The final window must be square and the panes used to construct the window must also be square (and of identical size). The principal has asked you to use six colours: pink, blue, purple, black and white (in that order) to create the window. The first, central glass pane will be pink. The second colour is blue, and these panes will be in a square of blue glass panes around the pink pane. The next outside square will be purple – and so on. If the principal wants a window with six layers (one of each colour), how many glass panes do you need to get in total? How many for each colour? What pattern do you notice?

This is just the start...the purple layer isn't finished yet!
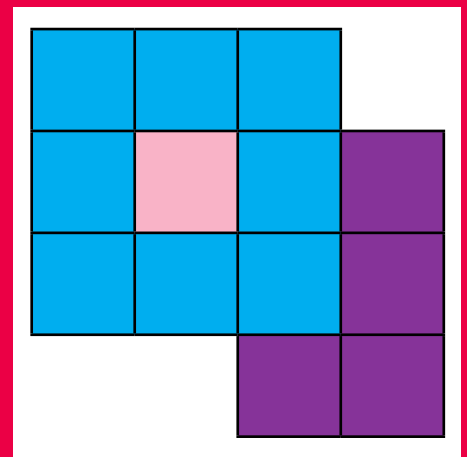
ENABLING PROMPT

Students can use graph paper to visually represent the pattern.

EXTENDING PROMPT

The principal has decided they want to go bigger! They want twice as many layers as before (so 12 in total - the same colours again). How many panes are on the outside layer? How many glass panes will be needed altogether? Twelve layers requires how many times the number of glass panes compared to 6 layers? Why? Additional extension: Can you work out a rule that will tell you how many glass panes you will need for the nth layer of a stained glass window?

ALTERNATIVE EXTENDING PROMPT

After your success with the first window, the principal has decided we should build the largest stained glass window in the world! At the moment, the largest has 2,500 glass panes. Using the same square pattern and order of colours, how many layers will you need? What will the last colour be? How many panes of this colour will you need?

Have you used architecture in your classroom as a launch for mathematical exploration? Our readers would love to hear your experiences. You can share your ideas with us at primenumber@mav.vic.edu.au.