? ? ? Problem Corner ? ? ?

edited by William J. Bruce and Roy Sinclair
University of Alberta, Edmonton

Problems suggested here are aimed at students of both the junior and senior high schools of Alberta. Solutions are solicited and a selection will be made for publication in the next issue of *delta-k*. Names of participants will be included. All solutions must be received (preferably in typewritten form) within 30 days of publication of the problem in *delta-k*.

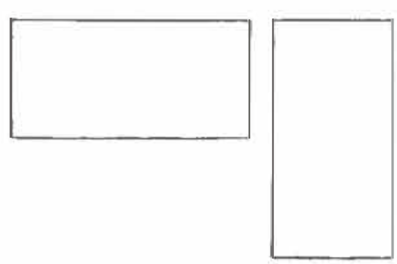
Mail solutions to: Dr. Roy Sinclair or Dr. Bill Bruce
Department of Mathematics
University of Alberta
Edmonton, Alberta T6G 2G1

Problem 7:

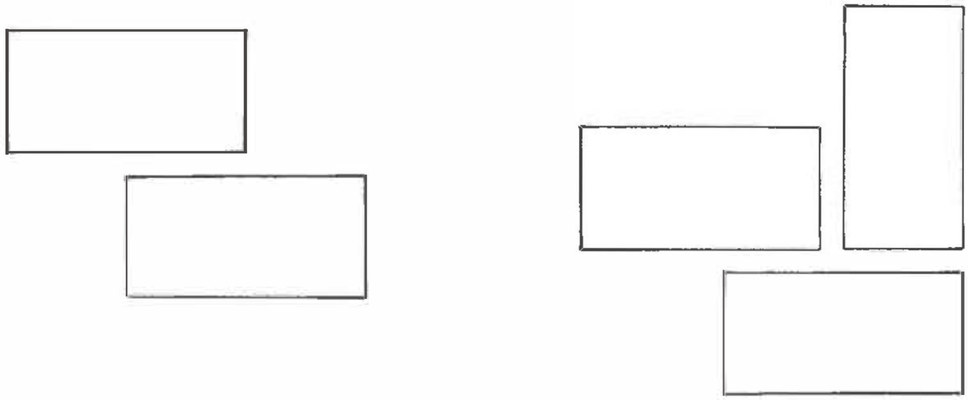
(submitted by William J. Bruce, University of Alberta)

The following problem is presented in two parts and both are suitable for trial and error approaches by students of all levels. Diagrams only are to be submitted for publication. However, proofs are welcome and will be acknowledged.

(a) Consider an 8 cm by 8 cm grid of 1 cm squares and a set of 1 cm by 2 cm dominos. Place the dominos on the checkerboard in such an arrangement so that any two dominos that touch each other do so only at right angles. Find the pattern that will leave the minimum number of spaces uncovered and state this number.



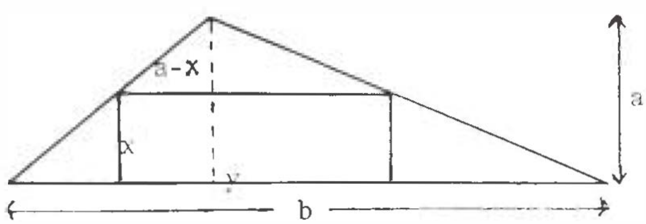
(b) As in (a) above except that, in addition to right angle butting, semi-adjacent parallelism is permitted also. By this we mean that the dominos may overlap half way along their sides. Again find the pattern that will leave the minimum number of spaces uncovered and state this number.



Note: The patterns developed in the above problems are a source for tiled table tops and floors or even for wall hangings done in needlepoint stitchery.

Solution for Problem 5:

(suggested by Dr. William Bruce)



From the figure, $\frac{x}{b} = \frac{a-x}{a} \rightarrow x = \frac{b}{a}(a-x)$

and $\frac{a-x}{y} = \frac{a}{b} \rightarrow y = \frac{b}{a}(a-x)$

From the latter, $xy = \frac{b}{a}x(a-x)$ gives the area of the rectangle. We must maximize xy, i.e., $\frac{b}{a}x(a-x)$. Complete the square and get $\frac{-b}{a}[(x-\frac{a}{2})^2 - \frac{a^2}{4}]$. This will have a maximum when $x = \frac{a}{2} \rightarrow y = \frac{b}{2}$. So the maximum area is $\frac{ab}{4}$. But $\frac{ab}{2}$ is the area of the triangle no matter on which side the rectangle is drawn.