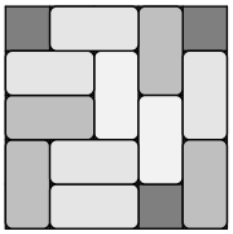
Question:

Beatrix places dominoes on a 5 × 5 board, either horizontally or vertically, so that each domino covers two small squares. She stops when she cannot place another domino, as in the example shown in the diagram.

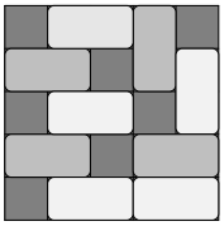


When Beatrix stops, what is the largest possible number of squares that may still be uncovered?

A 4 B 5 C 6 D 7 E 8

Answer:

The board has 25 squares. Each domino covers two squares. So, however many dominoes are placed on the board, the total number of squares that are covered will be even. So the number of uncovered squares will be odd. In particular, it is not possible to have 8 uncovered squares.



The diagram shows that it is possible for Beatrice to place 9 dominoes on the board in such a way that she cannot place another domino. This leaves 7 uncovered squares.

As this is the largest odd number given as one of the options, we conclude that D is the correct option.

Question:

In the addition sum shown, each letter represents a different non-zero digit. What digit does X represent?

$$\begin{array}{cccc} & S & E & E \\ + & S & E & E \\ \hline A & X & E & S \end{array}$$

A 1 B 3 C 5 D 7 E 9

Answer:

From the units column we see that either $E+E = S$, or there is a carry, in which case $E+E = 10+S$. However, from the tens column, we deduce that $E + E \neq S$. So there is a carry from the units column to the tens column.

Therefore, from the tens column we see that

$$1 + E + E = 10 + E.$$

If we subtract $E + 1$ from both sides of this equation, we deduce that $E = 9$. It now follows from the units column that $S = 8$. Hence the sum is

$$\begin{array}{cccc} & 8 & 9 & 9 \\ + & 8 & 9 & 9 \\ \hline 1 & 7 & 9 & 8 \end{array}$$

It follows that X represents 7.