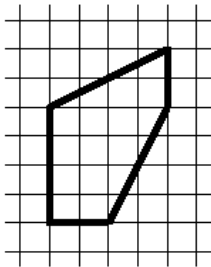


# Problems for October 24, 2009

1. A building with 15 floors has an elevator. There are only two buttons in this elevator, which say  $+7$  and  $-9$  (i.e. the elevator can go either 7 floors up, or 9 floors down). Can one use this elevator to go from the 3rd floor to the 12th floor?
2. Is it true that if you have 25 coins (1 cent, 5 cents, 10 cents or 25 cents) then at least 7 of them must be of the same denomination?
3. There are two types of balls in a non-transparent sack: black and white. What is the smallest number of balls that you should take out of the sack without looking, if you want to end up with at least three balls of the same color?
4. You work at a store which has received a container with 300 boots in it. It is known that 150 boots are for the left foot and 150 are for the right foot, and also that the boots are in three different sizes. Prove that it is possible to find at least 50 valid pairs (a valid pair has one left boot and one right boot of the same size).
5. Cut the pentagon on the picture into two identical pieces:



6. Cut either of the three shapes below into two pieces in such a way that the same pieces can be used to put together the other two shapes:



## Problems to do at home.

1. Can you cook a cake which can be cut into four pieces with a single straight cut?
2. On a table, you see five coins in a line. The middle coin lies heads up, all other coins tails up. You are allowed to turn over three consecutive coins. Can you end up with all five coins lying heads up?
3. A square was cut into five pieces. Four of them got lost and the one which survived has the shape of the regular octagon (see below). Can you say how long was the side of the original square? Why?

