

1. Consider the integer $30x070y03$ where x, y are unknown digits. Find all possible values of x, y so that the given integer is a multiple of 37.
2. In $\triangle ABC$, $AB = AC = 14\sqrt{2}$, D is the midpoint of CA and E is the midpoint of BD . Suppose $\triangle CDE$ is similar to $\triangle ABC$. Find the length of BD .
3. One hundred balls labelled 1 to 100 are to be put into two identical boxes so that each box contains at least one ball and the greatest common divisor of the product of the labels of all the balls in one box and the product of the labels of all the balls in the other box is 1. Determine the number of ways that this can be done.
4. Determine all positive integers n with at least 4 factors such that n is the sum of the squares of its 4 smallest factors.
5. You are given some equilateral triangles and squares, all with side length 1, and asked to form convex n sided polygons using these pieces. If both types must be used, what are the possible values of n , assuming that there is sufficient supply of the pieces?