

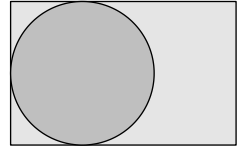
- C1.** The positive integer  $N$  has six digits in increasing order. For example, 124 689 is such a number.

However, unlike 124 689, three of the digits of  $N$  are 3, 4 and 5, and  $N$  is a multiple of 6.

How many possible six-digit integers  $N$  are there?

- C2.** A circle lies within a rectangle and touches three of its edges, as shown.

The area inside the circle equals the area inside the rectangle but outside the circle.



What is the ratio of the length of the rectangle to its width?

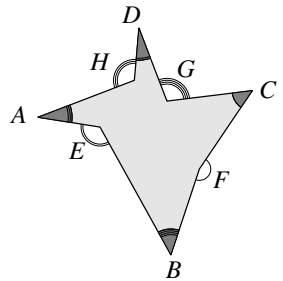
- C3.** The addition sum  $XCV + XXV = CXX$  is true in Roman numerals.

In this question, however, the sum is actually the letter-sum shown alongside, in which: each letter stands for one of the digits 0 to 9, and stands for the same digit each time it occurs; different letters stand for different digits; and no number starts with a zero.

$$\begin{array}{r} XCV \\ + XXV \\ \hline CXX \end{array}$$

Find all solutions, and explain how you can be sure you have found every solution.

- C4.** Prove that the difference between the sum of the four marked interior angles  $A, B, C, D$  and the sum of the four marked exterior angles  $E, F, G, H$  of the polygon shown is  $360^\circ$ .

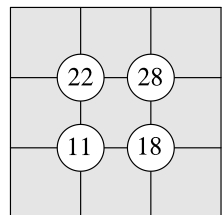


- C5.** In the expression below, three of the + signs are changed into - signs so that the expression is equal to 100:

$$\begin{aligned} &0 + 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 \\ &\quad + 11 + 12 + 13 + 14 + 15 + 16 + 17 + 18 + 19 + 20. \end{aligned}$$

In how many ways can this be done?

- C6.** In the puzzle *Suko*, the numbers from 1 to 9 are to be placed in the spaces (one number in each) so that the number in each circle is equal to the sum of the numbers in the four surrounding spaces.



How many solutions are there to the *Suko* puzzle shown alongside?