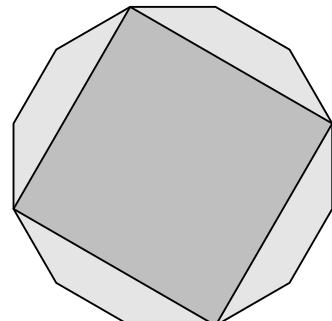


# Hamilton Olympiad 2018

- H1.** The positive integers  $m$  and  $n$  satisfy the equation  $20m + 18n = 2018$ .  
How many possible values of  $m$  are there?
- H2.** How many nine-digit integers of the form ‘ $pqrpqrpqr$ ’ are multiples of 24?  
(Note that  $p$ ,  $q$  and  $r$  need not be different.)

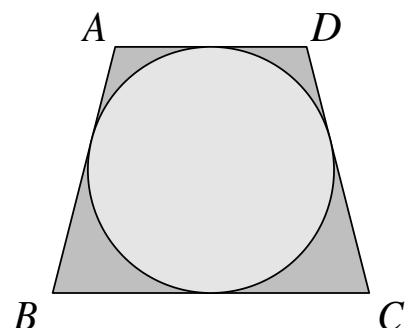
- H3.** The diagram shows a regular dodecagon and a square, whose vertices are also vertices of the dodecagon.

What is the value of the ratio  
area of the square : area of the dodecagon?



- H4.** The diagram shows a circle and a trapezium  $ABCD$  in which  $AD$  is parallel to  $BC$  and  $AB = DC$ . All four sides of  $ABCD$  are tangents of the circle. The circle has radius 4 and the area of  $ABCD$  is 72.

What is the length of  $AB$ ?



- H5.** A two-digit number is divided by the sum of its digits. The result is a number between 2.6 and 2.7.  
Find all of the possible values of the original two-digit number.

- H6.** The figure shows seven circles joined by three straight lines.

The numbers 9, 12, 18, 24, 36, 48 and 96 are to be placed into the circles, one in each, so that the product of the three numbers on each of the three lines is the same.

Which of the numbers could go in the centre?

