THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

2010 UQ/QAMT Problem Solving Competition - Year 9 & 10 Paper

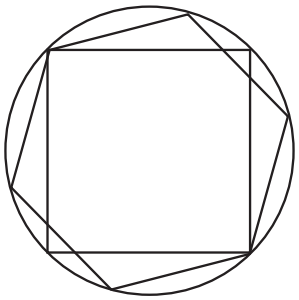
All questions have equal value.

Question 1
There are 15 cars in a parking lot.

(1) Each car is red, yellow, blue or green.
(2) There is at least one of each colour.
(3) A majority of the cars are red.
(4) There are more blue cars than green cars.
(5) There are fewer yellow cars than any other color.

How many green cars are there?

Question 2
A square and regular hexagon are drawn inside a unit circle as shown. What is the total area covered by the square and hexagon?



Question 3
Find positive whole numbers a, b, c such that $a^2 = 2b^3 = 3c^5$.

Question 4
Let N be the (decimal) integer $\overbrace{11\cdots1}^{2010}$ (with 2010 digits). What is the 1000th digit after the decimal point of $\sqrt{N}$?

Question 5
Place the numbers $1, \ldots, 9$ in a 3×3 square such that each of the sum of the rows, columns and diagonals is different. This is an *anti-magic square.*

Question 6
Triangle ABC is isosceles with $|AB| = |AC|$. Points D, E, F are drawn with $|AE| = |ED| = |DF| = |FC| = |BC|$. What is the angle BAC?