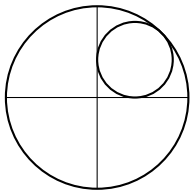
MATHEMATICS ENRICHMENT CLUB.
Problem Sheet 17, September 24, 2019

1. *AMC 2010 Senior Division, Q16.*
   The 5-digit number $a986b$, where a is the first digit and b is the units digit, is divisible by 72. What is the value of $a + b$?

2. *AMC 2010 Senior Division, Q19.*
   A circle is inscribed in a quadrant of a larger circle. What is the ratio of the area of the inner circle to that of the quadrant?



3. *AMC 2010 Senior Division, Q24.*
   What is the smallest n such that no matter how n points are placed inside or on the surface of a cube of side length 16 units, there are at least two of these points which are closer than 14 units to each other?

4. A sequence of real numbers, $f x_1; x_2; x_3; : : : g$, is defined by

$$x_1 = \sqrt{2}; \qquad x_2 = \sqrt{3};$$
$$x_n = x_{n\ 1} \quad x_{n\ 2} \quad \text{for } n \quad 3:$$

Senior Questions

1. The numbers x and y are positive integers that satisfy

$$3x^2 \quad 8y^2 + 3x^2y^2 = 2008.$$

   Find all possible values of x and y.

2. *AMC 2010 Senior Division, Q26.*
   A polynomial f is given. All we know about f is that all its coe cients are non-negative integers, $f(1) = 6$ and $f(7) = 3438$.

   What is the value of $f(3)$?

3. *AMC 2008 Senior Division, Q29.*
   A point O is inside an equilateral triangle PQR and the perpendiculars OL, OM and ON are drawn to the sides PQ, QR and RP respectively.

   The ratios of the lengths of the perpendiculars $OL : OM : ON$ is $1 : 2 : 3$. If

$$\frac{\text{area of } LONP}{\text{area of } 4PQR} = \frac{a}{b},$$

   where a and b are integers with no common factors, what is the value of $a + b$?