ANSWERS

A) _____   D) _____

B) _____   E) _____

C) (_____ , _____) F) _____

***** NO CALCULATORS ON THIS ROUND ****

A) If $a \neq b$, GCF$(a, b) = 1$ and $|b - 87| < 14$, there are exactly <u>two</u> ordered pairs (a, b)
   for which $92_a = 29_b$. Note: a and b denote the bases of two-digit numbers.
   If the specific ordered pairs are (a_1, b_1) and (a_2, b_2) and $a_1 < a_2$,

   then what is the value of the determinant $\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}$?

B) Let $x =$ the minimum positive integer for which $(a + 1)^2 + a > 1200$.
   Let $y =$ the minimum integer value of a for which $|\sqrt{a+1} - \sqrt{a}| < 0.1$
   Determine the sum of the prime factors of the product $x(x + y)$.

C) If A and B are integers and $(-1 + i)$ is a root of $p(x) = x^4 + Ax^2 + Bx - 6 = 0$, find the
   ordered pair (A, B).

D) Let A and B denote positive integers and $B \neq 1$. Find <u>all</u> possible ordered pairs (A, B) for
   which the ratio $(164 - 2A) : (3A - 6)$ is equal to the ratio $B : 1$.

E) In semicircle O, arcs $\overset{\frown}{OC}$ and $\overset{\frown}{OD}$ centered at A and B are drawn passing through O. $AO = 6$
   Find the <u>exact</u> area of the shaded region?
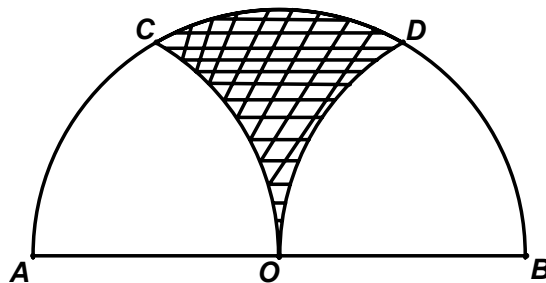
F) What is the smallest <u>integer</u> coefficient in the expansion of $(4t + \frac{v}{2})^8$?