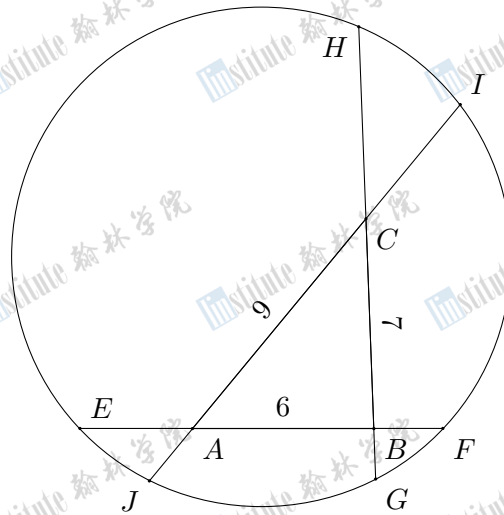


Tiebreaker Round

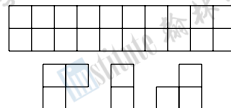
CHMMC 2010

February 20, 2010

1. The monic polynomial f has rational coefficients and is irreducible over the rational numbers. If $f(\sqrt{5} + \sqrt{2}) = 0$, compute $f(f(\sqrt{5} - \sqrt{2}))$. (A polynomial is *monic* if its leading coefficient is 1. A polynomial is *irreducible* over the rational numbers if it cannot be expressed as a product of two polynomials with rational coefficients of positive degree. For example, $x^2 - 2$ is irreducible, but $x^2 - 1 = (x + 1)(x - 1)$ is not.)
2. In the following diagram, points $E, F, G, H, I,$ and J lie on a circle. The triangle ABC has side lengths $AB = 6, BC = 7,$ and $CA = 9$. The three chords have lengths $EF = 12, GH = 15,$ and $IJ = 16$. Compute $6 \cdot AE + 7 \cdot BG + 9 \cdot CI$.



3. Compute the number of ways of tiling the 2×10 grid below with the three tiles shown. There is an infinite supply of each tile, and rotating or reflecting the tiles is not allowed.



4. Compute the number of positive divisors of 2010.