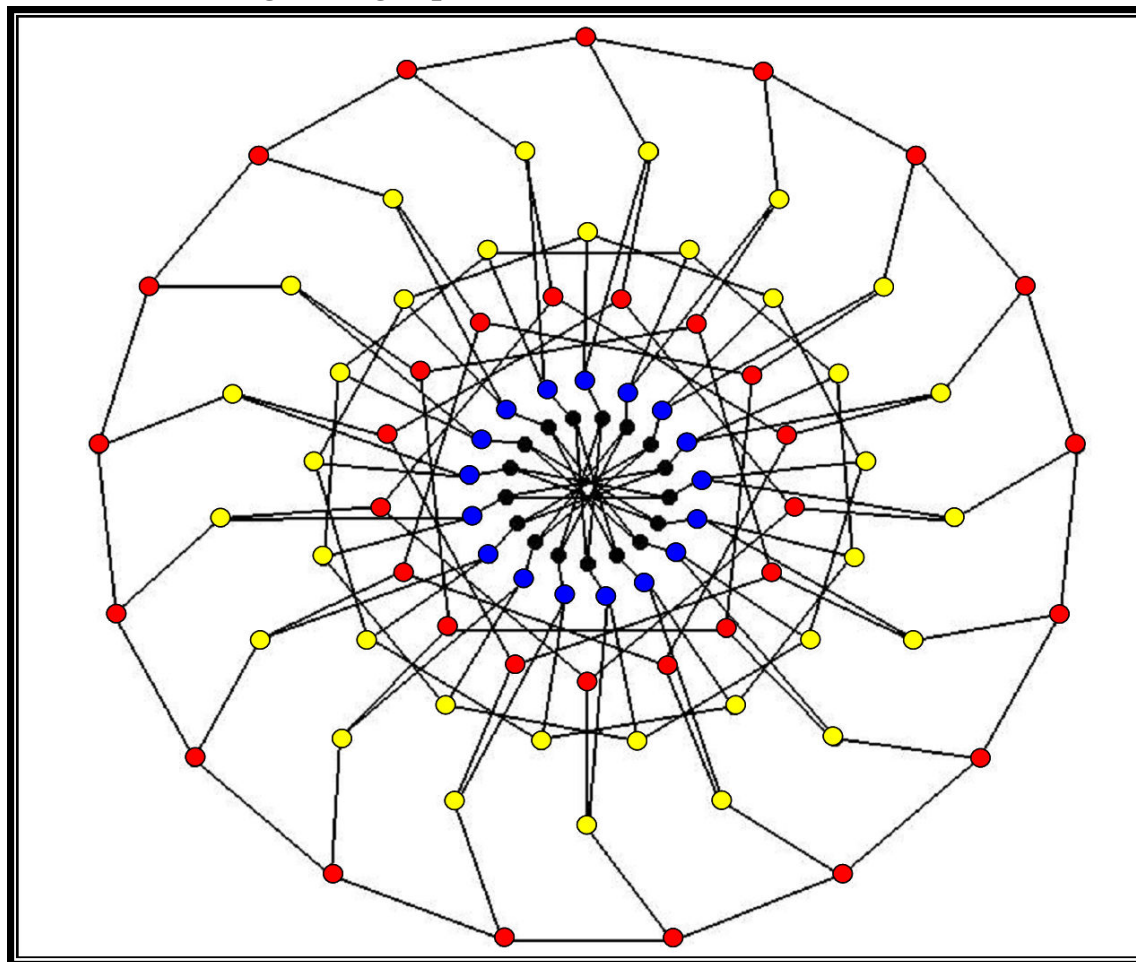




THEOREM OF THE DAY

Cameron's Theorem on Distance Transitive Graphs *For any integer $k > 2$ there exist only finitely many finite distance-transitive k -regular graphs.*



The Biggs–Smith graph is the largest distance-transitive graph that is 3-regular (every vertex adjacent to precisely 3 others). It has 102 vertices which have been colour-coded here according to their distance from the innermost circle of 17 (black) vertices. Distance transitivity means: if a and b are the same distance apart as α and β then there is a permutation of the vertices which takes a to α and b to β and which preserves all edge relationships.

Norman Biggs and Derek H. Smith proved in 1971 that there are exactly twelve 3-regular distance transitive graphs. It is at first sight very surprising that even a strong condition on symmetry should defeat the variety available in arbitrarily large graphs. Peter Cameron's deep theorem (1982) shows that this defeat applies even when arbitrarily many adjacencies are allowed.

Web link: www.math.carleton.ca/~robertb/dtg.pdf (1.9MB) (see chapter 10, I adapted the drawing of the Biggs-Smith graph from p. 116).

Further reading: *Algebraic Graph Theory (2nd Edition)* by Norman Biggs, Cambridge University Press, 1994.

