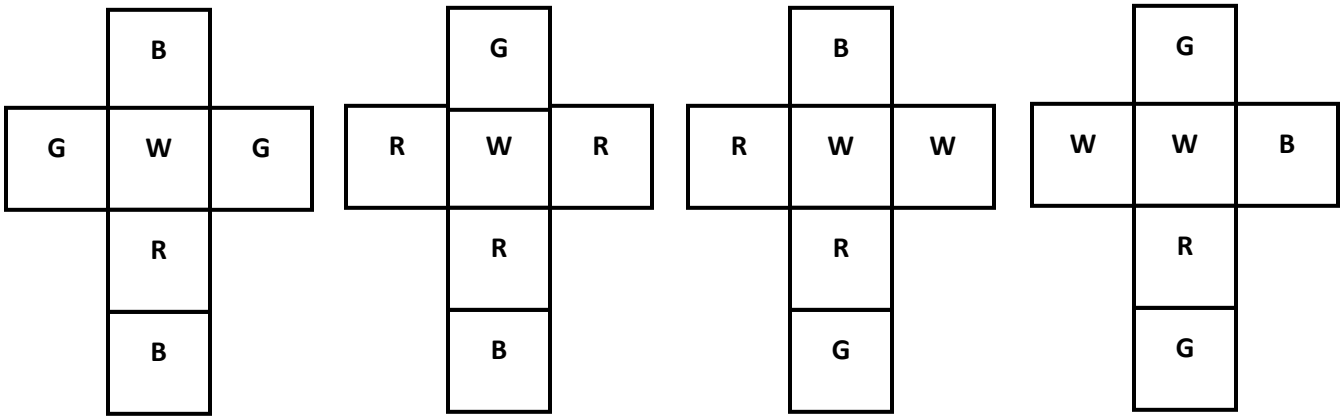
Review questions

State whether the following two statements are true or false

1. Edge chromatic number of circle graphs can be either two or three.
2. There are some complete graphs with n vertices which doesn't contain n(n-1)/2 edges
3. Solve instant insanity



Above figure shows four unwrapped cubes that form the instant insanity puzzle. The letter "R", "W", "B" and "G" stand for the colors red, white, blue and green. The object of the puzzle is to stack the blocks in a pile of 4 in which a way that each of the colors appear exactly once on each of the four sides of the stack.

Solutions

1. True, If the number of edges are in even number there will be even vertices. Let them be 1,2,3,…….,2n. We can colour them with minimum two colours where adjacent edges won't get same colour. If the number of edges are in odd number, there will be odd vertices. Let them be 1,2,3,…….,2n,2n+1. We can't colour them with two colours, we need minimum 3 colours to colour where adjacent edges won't get same colour.
2. False
   All complete graphs with n vertices contain n(n-1)/2 edges.
   Proof by Induction: If n=1, zero edges are required. 1(0)/2=0
   Assume that a complete graph with k vertices has k(k-1)/2 edges. When we add the $(k+1)^{st}$ vertex, we need to connect it to the k original vertices, requiring k additional edges. We will then have k(k-1)/2+k=(k+1)((k+1)-1)/2 edges.
3. Answers will be given during presentation