The Exercise Science Department would like to develop an optimal training plan for a marathon. They would like to compare four different types of cardiovascular programs, and three different types of muscular workouts.

They recruit Brother Cromar’s experimental design class where there were 24 students in the class. Each student was assessed a fitness level and were put in a group of three based on fitness level, where there were eight groups of three students created. Each of the eight groups was randomly assigned to receive a cardiovascular training plan, where 2 groups were involved in each training plan.

Within each participating group, each student was randomly assigned muscular workout, where each student would randomly receive one of the three muscular workouts.

Other “blinded faculty members” who are evaluating the results did not know which groups got which cardiovascular program or muscular workouts. These other faculty members were chosen to evaluate the results of the experiment. The students were then tested to see how fast they could do a 5k race at the end of the experiment.

* Factors
  + Whole plot would be the four cardiovascular programs
  + Within plot would be the muscular workouts
  + Block would be the eight groups
  + Interaction
* Response Variable
  + Time for 5k
* Equation – Statistical Model
* Levels of a factor
  + 4 programs
  + 3 exercises
  + 8 blocks
* Treatment Combinations (12 combinations = Factor A \* Factor B levels)
  + 1a, 1b, 1c, 2a, 2b, 2c, ect.
* Interaction
  + The interaction is the program and the exercise. If there is an interaction, than the cardiovascular method on 5k changes across the exercises.
* Blocking
  + The blocking is done by pretests assigning 3 students to each group block in order to block for the exercise method.
* Experimental Units (two different types)
  + Students for exercise/group or cardio
* Creating partial ANOVA tables (Source and df)
  + Grand mean = 1
  + Program = 3
  + Blocks = 4
  + Within = 2
  + Interaction = 6
  + Residuals = 8
* Null and Alternative Hypotheses for main effects and interaction using effects from the equation
  + A=One is different
  + B=One is different
  + C=Interaction
* F-tests (degrees of freedom for each main effects and interaction)
  + Cardio F(3,4)
  + Muscular F()
  + Interaction F()