Fashion Gang

A group of mathematicians who happen to be teenage girls decide to form a fashion gang. The rules of the gang are that every day each girl must wear a tank top that is either blue or black; sunglasses whose rims are either black or brown; capri pants that are black, red, white or pink; and lipstick that is pink, red or brown. Each pair of girls must differ in at least two of these items. For example, if they wear the same color tank top and lipstick, then they must differ in their choice of sunglass rims and capris. Differing in more than two items is also acceptable.

There are two challenges: What is the largest number of girls who could be in this gang, and what would be the maximal possible number of outfits (that is, what might each girl wear)? What is the minimum number of girls that could be in this gang so that they satisfy the difference constraint but so that adding one girl would violate the constraint? Again, show a possible outfit.

Here is a warm-up: Suppose there are just three attributes and they are all binary: a tank top that is blue or black, sunglass rims that are black or brown, and capris that are either black or red. Try to find maximal gangs as small as two and as large as four. SA

LARGEST GANG

SMALLEST GANG

SARA CHEN

Answer to Last Month's Puzzle

The delivery trucks can reach their destinations in six minutes using the routing schedule shown in detail at www.sciam.com.

This is in fact a minimum-time solution. Because 11 traversals are necessary and only two are possible in each minute, no solution can do better than six minutes.

Web Solution

For a peek at the answer to this month's problem, visit www.sciam.com