Assignment 5 and 6 are combined and are setup for the semester project [16%]
Due Date: March 31, 2015    * Please Ask Questions Early *

You may assign work any way you choose between members of your group.
Your goal is to simulate vehicles moving across a city street grid.

Conditions of the simulation:
0. Each slot is 4px. There is a 1px buffer in front and back of each vehicle that has COLOR: BLACK.
1. On each vertical (North-South) segment, there are 15 slots. There are 12 East-West streets.
2. On each horizontal (East-West) segment, there are 45 slots. There are 5 North-South streets.
3. Each intersection is 5 East-West slots by 4 North-South slots.
4. There are two types of vehicles each occupying a different number of slots.
   Cars (2 slots x 1 slot wide) COLOR: BLUE
   Small Trucks (3 slots x 1 slot wide) COLOR: YELLOW
   Bus (4 slots x 1 slot wide ) COLOR: GREEN
5. Slots account for space between vehicles for this assignment.
6. Each vehicle will move directly (East) across the grid and not change row, then exit off the right side.
7. Stoplights are timed equally in all directions.
8. A vehicle will only proceed across an intersection if there is sufficient space for it to completely traverse the intersection.
9. On each clock cycle, you will need to first adjust the model for all vehicles that can permissibly move, then adjust it for the remainder and repeat. The vehicles should be simultaneously redrawn in their new positions after the model updates are complete.
10. Vehicles will only proceed if there is space for them to fit on the street they are moving into.
11. If a light turns red while a vehicle is in an intersection, no other traffic will enter the intersection until it exits the intersection.
12. Vehicles always move 2 slots per second if there is no other car or light is stopping them, otherwise they will move 0 or 1 slots.
13. Vehicles can accelerate to speed 2 or decelerate to zero instantaneously.
14. For this assignment, each East-West street can be considered to have four "lanes" (1=Southmost 2=Next 3=Next 4=Northmost). Draw cars in lane 2 only. Note: The Southmost and Northmost "lanes" are reserved for parking.

Requirements:
1. Using the MVC pattern, simulate and display the traversal of 1200 vehicles through the grid once. Update the entire traffic grid every 1 second.
2. For the blocks between streets, draw a bounding rectangle.
3. "Queue" 100 vehicles at each intersection on the West edge of the grid.
   Assume the light at that intersection turns green for East-West traffic at simulation time zero, at which time the first vehicles enter the intersection.
4. Calculate and print the total fuel consumed by all vehicles.
5. Calculate and print the average time for all vehicles to traverse the grid.
6. Calculate and print the total fuel consumption for three simulations, where all stoplights have cycle duration: 10, 20, and 30 seconds, using this fuel consumption table:

Fuel Consumption Table:

<table>
<thead>
<tr>
<th>Speed</th>
<th>Fuel per second</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>0</td>
</tr>
<tr>
<td>Car</td>
<td>1</td>
</tr>
<tr>
<td>Car</td>
<td>2</td>
</tr>
<tr>
<td>Small Truck</td>
<td>0</td>
</tr>
<tr>
<td>Small Truck</td>
<td>1</td>
</tr>
<tr>
<td>Small Truck</td>
<td>2</td>
</tr>
<tr>
<td>Bus</td>
<td>0</td>
</tr>
<tr>
<td>Bus</td>
<td>1</td>
</tr>
<tr>
<td>Bus</td>
<td>2</td>
</tr>
</tbody>
</table>