1)

a. the scatter plots compare Dijkstra and A^0 in terms of the number of nodes (states) expanded and their running time. the story of the plots tells us that all the points are above the $y=x$ line. this suggests that Dijkstra in general explores more nodes (states) and takes a longer time to find the optimal path

b. The difference in distribution between the two plots is because the running time takes into consideration not just the number of nodes expanded, but also including the expansion of each node (how many neighbors do we explore). the number of node expansions is a huge difference between the two search algorithms

2) the change in the multiplication of the heuristic from 1.5 to 2 makes a difference in the number of nodes being expanded.

- the search prioritizes the h value a lot more, meaning the paths that look closer will be prioritized.
- this also makes A* explore less nodes

- in terms of the scatter plot, this makes the A* search algorithm more efficient (as long as its admissable), as it explores less nodes

3) if we change the Dijkstra and A* algorithm to not update the cost and parent pointer to a node once it finds a better path, it will no longer be able to find the optimal path all the time in fact lead to sub-optimal paths. Solution cost will

be random, and solution path will not be the shortest. if heuristic is admissable, A* might perform reasonably well. it may not need to revisit paths.