

# Planning Heuristic Search Results for Cargo Problem

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All three of the cargo planning problems were attempted to be solved using the following heuristic search methods:

- astar\_search h\_ignore\_preconditions – type 9
- astar\_search h\_pg\_levelsum – type 10

## Metric summary

### Heuristic:

Problem #	Search Type	Length	Time	Expansions	Goal Tests	New Nodes
1	9	6	.04 sec	41	43	170
1	10	6	.68 sec	11	13	50
2	9	9	4.69 sec	1450	1452	13303
2	10	9	56.21 sec	86	88	841
3	9	12	17.58 sec	5040	5042	44944
3	10	12	292.53 sec	316	318	2912

I included the metrics from the non-heuristic analysis for comparison.

### Non-Heuristic:

Problem #	Search Type	Length	Time	Expansions	Goal Tests	New Nodes
1	1	6	.33 sec	43	56	180
1	3	12	.01 sec	12	13	48
1	5	6	.04 sec	55	57	224
2	1	9	13.09 sec	3343	4609	30509
2	3	575	2.89 sec	582	583	5211
2	5	9	11.25 sec	4852	4854	44030
3	1	12	98.91 sec	14663	18098	129631
3	3	596	3.21 sec	627	628	5176
3	5	12	50.17 sec	18235	18237	159716

## Result Analysis

Here some interesting observations:

### *Optimally*

It is clear that the heuristic based searches perform better than the non-heuristic searches in generating optimal results.

### *Time taken*

Even though the h\_pg\_levelsum heuristic resulted in optimal results, it still took longer. This is likely due to time to generate graphplan. h\_pg\_levelsum was also faster than the non-heuristics searches.

### *Memory*

Here the h\_ignore\_preconditions performed the best with the lowest overall Expansions. Again the graphplan is a great guide for the search algorithm to go down the correct paths but at the expense of more time to figure it out.