Results

	Input sizes			Exact agorithm Heuristic algorithm													
Test			MIP			Ī			BaB			BFS			Greedy		
	n_items	n_trucks	n_trucks_used	cost	running_time	n_trucks_used	cost	running_time	n_trucks_used	cost	running_time	n_trucks_used	cost	running_time	n_trucks_used	cost	running_time
Phase_1/input_ 1.txt	11	11	3	379	300.010658	3	379	1.966683865	3	440	0.00193	3	440	0.000599	3	480	0.000595
Phase_1/input_ 2.txt	12	12	3	524	300.0128131	3	525	2.271491766	3	586	0.00382	3	586	0.00054	3	587	0.000228
Phase_1/input_ 3.txt	13	13	3	637	300.0147672	2	459	0.343653679	3	637	0.003006	3	637	0.000526	3	637	0.000256
Phase_1/input_ 4.txt	14	14	5	649	188.1130509	5	650	0.496277809	6	777	0.017988	6	777	0.00094	6	777	0.000207
Phase_1/input_ 5.txt	15	15	4	624	300.017308	3	513	2.441635847	4	624	0.017779	4	624	0.0007	4	738	0.000188
Phase_1/input_ 6.txt	16	16	4	745	300.0195739	4	638	1.357476234	4	745	0.013308	4	745	0.001061	4	745	0.000206
Phase_1/input_ 7.txt	17	17	7	1287	300.0343549	5	929	39.27156782	5	1098	0.089258	6	1124	0.001593	7	1394	0.000234
Phase_1/input_ 8.txt	18	18	6	1388	300.0267889	6	1169	1.302475929 102.588644	7	1323	0.179056	7	1323	0.001843	6	1388	0.000268
Phase_1/input_ 9.txt Phase 1/input 10.txt	19 20	19 20	4 6	717 1194	300.0308912 300.029253	3	508 626	283.2950087	4	618 626	0.019588 0.016302	4	618 739	0.001418 0.001687	4 5	618 840	0.000241 0.000264
Phase 1/input 11.txt	21	21	6	1410	300.029233	5	1023	93.13276863	6	1297	0.279418	5	1180	0.001087	6	1400	0.000204
Phase 1/input 12.txt	22	22	7	2185	300.0430517	6	1280	300.6107924	6	1556	0.733084	7	1601	0.003003	8	1812	0.000307
Phase 1/input 13.txt	23	23	8	1961	300.062957	6	937	300.6701977	7	1137	1.5224	6	958	0.00379	7	1384	0.000304
Phase 1/input 14.txt	24	24	11	2631	300.0578642	7	1367	300.7935696	8	1547	2.41217	7	1556	0.005307	9	1882	0.000445
Phase_1/input_15.txt	25	25	9	2001	300.0336552	6	1199	300.6030931	7	1464	7.50056	8	1447	0.006407	8	1531	0.000356
Phase_1/input_16.txt	26	26	19	5642	300.0817699	7	1582	300.2513192	8	1938	10.5518	8	1853	0.008196	9	2115	0.000401
Phase_1/input_17.txt	27	27	20	6403	300.097332	8	2198	300.8694186	10	2851	107.306	11	3004	0.008972	12	3392	0.000434
Phase_1/input_18.txt	28	28	N/A	N/A	N/A	6	1225	300.3192265	7	1400	23.8025	7	1400	0.006065	6	1826	0.000397
Phase_1/input_19.txt	29	29	N/A	N/A	N/A	6	1500	300.3155289	6	1620	33.118	7	1585	0.006674	7	1689	0.000439
Phase_1/input_20.txt	30	30	N/A	N/A	N/A	10	2138	300.4902072	N/A	N/A	N/A	11	2444	0.010007	12	2666	0.000517
Phase_1/input_21.txt	31	31	28	9405	300.1865339	6	1768	300.3711581	6	1768	23.2625	7	1881	0.008157	7	2032	0.000456
Phase_1/input_22.txt	32	32	32	9577	298.6576328	7	1495	300.429951	8	1557	35.8825	8	1645	0.008687	8	1738	0.000498
Phase_1/input_23.txt	33	33	32	9140	299.460072	8	1349	300.7887225	8	1394	113.718	8	1394	0.009524	9	1673	0.000506
Phase_1/input_24.txt	34	34	N/A	N/A	N/A	7	1740	300.4620039	N/A	N/A	N/A	8	1858	0.009818	8	1887	0.000788
Phase_1/input_25.txt	35 36	35 36	N/A	N/A N/A	N/A N/A	12 9	2496 1523	300.4891446 301.1055863	N/A N/A	N/A N/A	N/A N/A	12 9	2774 1602	0.014589 0.011048	14 9	3208 1602	0.000687 0.000548
Phase_1/input_26.txt Phase_1/input_27.txt	37	37	N/A N/A	N/A N/A	N/A	9	1727	301.1055863	N/A	N/A	N/A	10	1842	0.011048	11	2189	0.000548
Phase 1/input 28.txt	38	38	N/A	N/A	N/A	11	2194	300.5394301	N/A	N/A	N/A	12	2515	0.013214	13	2576	0.000658
Phase_1/input_29.txt	39	39	N/A	N/A	N/A	8	1858	300.8188777	N/A	N/A	N/A	9	1970	0.018521	9	2056	0.000645
Phase 1/input 30.txt	40	40	N/A	N/A	N/A	10	2221	300.7351551	N/A	N/A	N/A	10	2380	0.018935	12	2668	0.000699
Phase 1/input 31.txt	41	41	N/A	N/A	N/A	10	2012	300.7084982	N/A	N/A	N/A	11	2257	0.019793	11	2270	0.000722
Phase_1/input_32.txt	42	42	N/A	N/A	N/A	10	1541	300.7638032	N/A	N/A	N/A	10	1642	0.018541	11	1764	0.000691
Phase_1/input_33.txt	43	43	N/A	N/A	N/A	10	1905	300.9634562	N/A	N/A	N/A	11	2038	0.021075	14	2390	0.000703
Phase_1/input_34.txt	44	44	N/A	N/A	N/A	11	2212	300.9319625	N/A	N/A	N/A	13	2414	0.029004	13	2480	0.000803
Phase_1/input_35.txt	45	45	N/A	N/A	N/A	10	1738	300.9554448	N/A	N/A	N/A	11	1866	0.0247	11	1871	0.000751
Phase_1/input_36.txt	46	46	N/A	N/A	N/A	14	3477	301.0340805	N/A	N/A	N/A	15	3830	0.037822	17	4312	0.000877
Phase_1/input_37.txt	47	47	N/A	N/A	N/A	11	1693	301.0436983	N/A	N/A	N/A	13	1920	0.03407	13	1972	0.000819
Phase_1/input_38.txt	48	48	N/A	N/A	N/A	10	2340	301.0657187	N/A	N/A	N/A	12	2328	0.058766	13	2819	0.000843
Phase_1/input_39.txt	49	49	N/A	N/A	N/A	11	1803	301.1742895	N/A	N/A	N/A	11	1892	0.029398	11	1892	0.000844
Phase_1/input_40.txt	50 100	50 100	N/A	N/A	N/A	11 20	2301	301.2176166	N/A	N/A	N/A	12	2400	0.038673	13	2566	0.000893
Phase_2/input_0.txt	100	235	N/A N/A	N/A N/A	N/A N/A	20 35	4342 4420	311.2589843 316.9155548	N/A N/A	N/A N/A	N/A N/A	21	4352 3342	0.360696 0.90581	22 23	4539 3448	0.002581 0.003002
Phase_2/input_ 1.txt Phase 2/input 2.txt	100	134	N/A N/A	N/A N/A	N/A N/A	28	5417	311.9190807	N/A N/A	N/A N/A	N/A N/A	28	5218	0.90581	23	5378	0.003002
Phase_2/input_ 3.txt	100	122	N/A	N/A	N/A	29	7155	309.6118357	N/A	N/A	N/A	31	6432	0.721128	33	6752	0.003107
Phase 2/input 4.txt	100	112	N/A	N/A	N/A	25	5613	308.7859726	N/A	N/A	N/A	27	5543	0.524375	28	5861	0.00269
Phase_2/input_ 5.txt	100	223	N/A	N/A	N/A	21	3423	316.1878135	N/A	N/A	N/A	22	3277	0.82329	23	3598	0.00203
Phase_2/input_ 6.txt	100	271	N/A	N/A	N/A	43	6232	319.653332	N/A	N/A	N/A	29	4571	1.48487	29	4598	0.00346
Phase_2/input_ 7.txt	100	235	N/A	N/A	N/A	19	3203	317.6867094	N/A	N/A	N/A	20	3100	0.834511	21	3289	0.00304
Phase_2/input_ 8.txt	100	100	N/A	N/A	N/A	24	5384	308.0122137	N/A	N/A	N/A	25	4904	0.374629	26	5296	0.002496
Phase_2/input_ 9.txt	100	188	N/A	N/A	N/A	44	5834	313.9515698	N/A	N/A	N/A	25	3819	0.838167	26	3896	0.002996
Phase_2/input_10.txt	100	284	N/A	N/A	N/A	25	4858	320.5264404	N/A	N/A	N/A	23	4157	1.24108	25	4463	0.003432
Phase_2/input_11.txt	110	203	N/A	N/A	N/A	42	5758	318.3541405	N/A	N/A	N/A	25	3768	0.922542	25	3798	0.003366
Phase_2/input_12.txt	120	237	N/A	N/A	N/A	53	6976	324.6034114	N/A	N/A	N/A	31	4425	1.72192	32	4609	0.004157
Phase_2/input_13.txt	130	130	N/A	N/A	N/A	39	8161	316.8200858	N/A	N/A	N/A	38	6616	1.23847	40	7030	0.004339
Phase_2/input_14.txt	140	272	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30	5001	2.2916	32	5240	0.005156
Phase_2/input_15.txt	150	217	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	36	7057	2.85681	36	7271	0.005512

| Phase 2/input 16.txt | 160 | 168 | N/A | 48 | 9911 | 3.12711 | 50 | 10311 | 0.006805 |
|----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|----------|-----|-------|----------|
| Phase 2/input 17.txt | 170 | 220 | N/A | 45 | 9251 | 4.38135 | 47 | 9847 | 0.007363 |
| Phase_2/input_18.txt | 180 | 296 | N/A | 50 | 8056 | 7.43123 | 53 | 8476 | 0.00821 |
| Phase 2/input 19.txt | 190 | 230 | N/A | 50 | 11069 | 5.83671 | 51 | 11316 | 0.008738 |
| Phase 2/input 20.txt | 200 | 299 | N/A | 45 | 7019 | 6.65435 | 45 | 7141 | 0.008561 |
| Phase 2/input 21.txt | 210 | 283 | N/A | 56 | 9438 | 8.94893 | 58 | 9586 | 0.010014 |
| Phase 2/input 22.txt | 220 | 256 | N/A | 48 | 9780 | 8.00982 | 50 | 9984 | 0.010272 |
| Phase 2/input 23.txt | 230 | 236 | N/A | 60 | 11122 | 9.61699 | 62 | 11447 | 0.011924 |
| Phase_2/input_24.txt | 240 | 261 | N/A | 58 | 11471 | 11.7635 | 58 | 11687 | 0.013761 |
| Phase_2/input_25.txt | 250 | 296 | N/A | 65 | 12657 | 16.2691 | 66 | 13095 | 0.01438 |
| Phase_2/input_26.txt | 260 | 285 | N/A | 66 | 12233 | 14.7325 | 67 | 12572 | 0.015034 |
| Phase 2/input 27.txt | 270 | 277 | N/A | 68 | 12133 | 15.3216 | 68 | 12314 | 0.015156 |
| Phase_2/input_28.txt | 280 | 296 | N/A | 70 | 13256 | 19.2155 | 72 | 13485 | 0.01663 |
| Phase 2/input 29.txt | 290 | 290 | N/A | 68 | 13981 | 20.3142 | 71 | 14493 | 0.017722 |
| Phase_2/input_30.txt | 300 | 300 | N/A | 79 | 14585 | 24.6525 | 82 | 14872 | 0.02013 |
| Phase_2/input_31.txt | 202 | 284 | N/A | 55 | 9495 | 8.38776 | 57 | 9845 | 0.009985 |
| Phase 2/input 32.txt | 160 | 190 | N/A | 42 | 7871 | 3.02305 | 42 | 7894 | 0.00636 |
| Phase 2/input 33.txt | 210 | 288 | N/A | 48 | 8438 | 7.83647 | 51 | 8898 | 0.009573 |
| Phase_2/input_34.txt | 103 | 141 | N/A | 27 | 5723 | 0.713942 | 28 | 6191 | 0.003096 |
| Phase 2/input 35.txt | 134 | 143 | N/A | 38 | 7034 | 1.67471 | 38 | 7202 | 0.004827 |
| Phase_2/input_36.txt | 238 | 278 | N/A | 53 | 9231 | 10.3219 | 56 | 9625 | 0.011651 |
| Phase_2/input_37.txt | 262 | 269 | N/A | 65 | 12994 | 14.634 | 66 | 13414 | 0.015959 |
| Phase_2/input_38.txt | 193 | 217 | N/A | 46 | 8357 | 5.07394 | 46 | 8567 | 0.009003 |
| Phase_2/input_39.txt | 103 | 217 | N/A | 25 | 4263 | 0.979595 | 27 | 4412 | 0.003357 |
| Phase_2/input_40.txt | 296 | 296 | N/A | 72 | 13590 | 22.7413 | 72 | 13904 | 0.017172 |
| Phase 2/input 41.txt | 205 | 268 | N/A | 52 | 8818 | 7.79164 | 52 | 8848 | 0.00937 |
| Phase_2/input_42.txt | 292 | 299 | N/A | 71 | 13557 | 20.8602 | 73 | 13976 | 0.017078 |
| Phase_2/input_43.txt | 274 | 290 | N/A | 70 | 13857 | 17.9614 | 71 | 14270 | 0.014842 |
| Phase_2/input_44.txt | 107 | 289 | N/A | 27 | 3824 | 1.48356 | 28 | 3955 | 0.00342 |
| Phase_2/input_45.txt | 256 | 262 | N/A | 57 | 11102 | 12.5021 | 57 | 11263 | 0.012047 |
| Phase_2/input_46.txt | 124 | 283 | N/A | 28 | 4405 | 1.8928 | 28 | 4503 | 0.004022 |
| Phase_2/input_47.txt | 291 | 293 | N/A | 69 | 14779 | 19.1717 | 72 | 15534 | 0.016263 |
| Phase_2/input_48.txt | 277 | 295 | N/A | 72 | 13734 | 20.7309 | 74 | 14248 | 0.015423 |
| Phase_2/input_49.txt | 166 | 181 | N/A | 43 | 8718 | 3.28653 | 43 | 8925 | 0.00622 |
| Phase_2/input_50.txt | 212 | 294 | N/A | 58 | 10761 | 10.6972 | 59 | 11139 | 0.010121 |
| Phase_2/input_51.txt | 266 | 296 | N/A | 72 | 14454 | 21.2771 | 72 | 14454 | 0.014961 |
| Phase_2/input_52.txt | 100 | 134 | N/A | 29 | 5053 | 0.688279 | 31 | 5503 | 0.002808 |
| Phase_2/input_53.txt | 112 | 220 | N/A | 30 | 5426 | 1.40337 | 30 | 5577 | 0.003542 |
| Phase_2/input_54.txt | 193 | 286 | N/A | 52 | 9062 | 7.96427 | 52 | 9153 | 0.00835 |
| Phase_2/input_55.txt | 250 | 292 | N/A | 63 | 12308 | 15.8852 | 65 | 12728 | 0.012982 |
| Phase_2/input_56.txt | 254 | 285 | N/A | 58 | 11083 | 13.4853 | 59 | 11312 | 0.012386 |
| Phase_2/input_57.txt | 167 | 284 | N/A | 42 | 6691 | 4.43349 | 44 | 7160 | 0.007517 |
| Phase_2/input_58.txt | 132 | 230 | N/A | 31 | 4855 | 2.07659 | 32 | 4963 | 0.004743 |
| Phase_2/input_59.txt | 180 | 300 | N/A | 44 | 7391 | 5.89049 | 45 | 7634 | 0.007711 |
| Phase_3/input_ 0.txt | 500 | 722 | N/A | 108 | 32442 | 208.99 | 113 | 33414 | 0.037901 |
| Phase_3/input_ 1.txt | 510 | 971 | N/A | N/A | 135 | 33230 | 0.039588 |
| Phase_3/input_ 2.txt | 520 | 649 | N/A | 118 | 36635 | 212.479 | 122 | 39081 | 0.040562 |
| Phase_3/input_ 3.txt | 530 | 902 | N/A | N/A | 130 | 36816 | 0.043375 |
| Phase_3/input_ 4.txt | 540 | 851 | N/A | N/A | 134 | 41045 | 0.044964 |
| Phase_3/input_ 5.txt | 550 | 956 | N/A | N/A | 126 | 32629 | 0.043191 |
| Phase_3/input_ 6.txt | 560 | 623 | N/A | 135 | 45308 | 265.435 | 144 | 49876 | 0.048545 |
| Phase_3/input_ 7.txt | 570 | 845 | N/A | N/A | 155 | 44032 | 0.052479 |
| Phase_3/input_ 8.txt | 580 | 999 | N/A | N/A | 136 | 36058 | 0.051139 |
| Phase_3/input_ 9.txt | 590 | 839 | N/A | N/A | 130 | 36266 | 0.048394 |
| Phase_3/input_10.txt | 600 | 980 | N/A | N/A | 150 | 38285 | 0.052297 |
| Phase_3/input_11.txt | 610 | 721 | N/A | N/A | 139 | 40094 | 0.050071 |
| Phase_3/input_12.txt | 620 | 807 | N/A | N/A | 160 | 52504 | 0.05951 |
| Phase_3/input_13.txt | 630 | 854 | N/A | N/A | 157 | 46139 | 0.056799 |
| Phase_3/input_14.txt | 640 | 864 | N/A | N/A | 165 | 58013 | 0.066937 |
| Phase_3/input_15.txt | 650 | 661 | N/A | N/A | 164 | 51850 | 0.05801 |
| Phase_3/input_16.txt | 660 | 875 | N/A | N/A | 154 | 44287 | 0.063807 |

Phase 3/input 17.txt	670	964	N/A	166	49792	0.0672											
Phase 3/input 18.txt	680	943	N/A	161	45139	0.067073											
Phase 3/input 19.txt	690	879	N/A	188	58691	0.0734											
Phase 3/input 20.txt	700	769	N/A	175	53908	0.069809											
Phase 3/input 21.txt	710	995	N/A	178	53781	0.076515											
Phase 3/input 22.txt	720	869	N/A	178	59030	0.078274											
Phase 3/input 23.txt	730	991	N/A	185	55242	0.081234											
Phase 3/input 24.txt	740	914	N/A	169	53131	0.074472											
Phase_3/input_25.txt	750	790	N/A	185	68612	0.086037											
Phase_3/input_26.txt	760	997	N/A	180	55554	0.085148											
Phase_3/input_27.txt	770	951	N/A	197	58140	0.114145											
Phase_3/input_28.txt	780	928	N/A	201	68719	0.093936											
Phase_3/input_29.txt	790	967	N/A	189	58565	0.094513											
Phase_3/input_30.txt	800	959	N/A	204	62302	0.105298											
Phase_3/input_31.txt	810	892	N/A	206	72212	0.105258											
Phase_3/input_32.txt	820	989	N/A	201	63072	0.105869											
Phase_3/input_33.txt	830	834	N/A	208	78826	0.115572											
Phase_3/input_34.txt	840	929	N/A	207	70134	0.113343											
Phase_3/input_35.txt	850	962	N/A	203	68794	0.116322											
Phase_3/input_36.txt	860	984	N/A	224	73030	0.120915											
Phase_3/input_37.txt	870	906	N/A	214	76390	0.115952											
Phase_3/input_38.txt	880	909	N/A	213	73077	0.111351											
Phase_3/input_39.txt	890	924	N/A	231	78392	0.119967											
Phase_3/input_40.txt	900	999	N/A	227	78594	0.119409											
Phase_3/input_41.txt	910	914	N/A	210	81821	0.115624											
Phase_3/input_42.txt	920	975	N/A	239	84569	0.134218											
Phase_3/input_43.txt	930	997	N/A	223	75695	0.118972											
Phase_3/input_44.txt	940	990	N/A	228	77089	0.149362											
Phase_3/input_45.txt	950	977	N/A	255	91028	0.13249											
Phase_3/input_46.txt	960	994	N/A	N/A N/A	239	89458	0.134436										
Phase_3/input_47.txt	970 980	988 992	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A	N/A	N/A N/A	N/A N/A	N/A	N/A N/A	249 247	100502 87650	0.141912 0.140229
Phase_3/input_48.txt Phase 3/input 49.txt	980	1000	N/A N/A	263	90256	0.140229											
Phase 3/input 50.txt	1000	1000	N/A	N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A N/A	N/A	N/A	N/A N/A	N/A N/A	N/A	230	81907	0.14731
Phase 3/input 51.txt	977	977	N/A	N/A	N/A	N/A	N/A	N/A	N/A N/A	N/A	N/A	N/A N/A	N/A	N/A	248	85006	0.135436
Phase 3/input 52.txt	728	913	N/A	176	51997	0.133436											
Phase 3/input 53.txt	551	968	N/A	N/A	N/A	N/A	N/A	N/A	N/A N/A	N/A	N/A	N/A N/A	N/A	N/A	120	29474	0.046009
Phase 3/input 54.txt	613	959	N/A	151	42504	0.057167											
Phase 3/input 55.txt	744	784	N/A	179	66742	0.086833											
Phase 3/input 56.txt	746	950	N/A	196	61142	0.096928											
Phase 3/input 57.txt	773	953	N/A	195	58395	0.094502											
Phase 3/input 58.txt	664	762	N/A	168	55283	0.073287											
Phase 3/input 59.txt	731	875	N/A	188	60015	0.091512											
_ i iiase_3/iiiput_33.txt	/31	0/3	IN/A	IV/A	IV/A	IV/A	N/A	IV/A	IN/A	IV/A	IV/A	I IV/A	IN/A	IN/A	100	00013	0.031312