

Jacob Turner

Engr-115

8-11 a.m.

10/21/2016

Input Parameters:

Measured Coutdoor:	448
Assumed Coutdoor:	400
Correction Factor:	-48

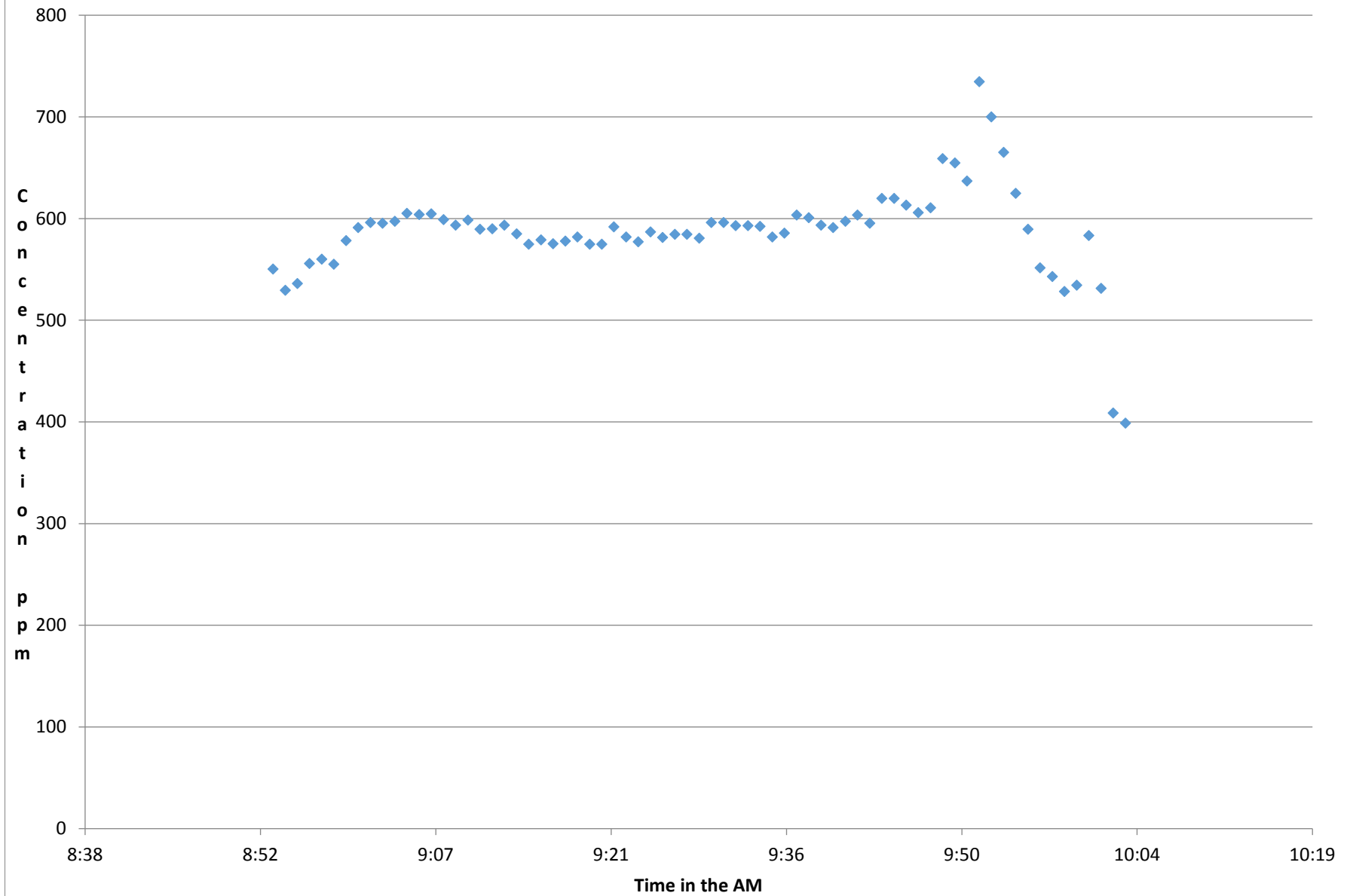
Analysis:

Measurement	Date and Time	HOBO CO2 Concentration [ppm]	Actual CO2 Concentration [ppm]
1	8:45	1497.6	1449.6
2	8:46	893.8	845.8
3	8:47	134.3	86.3
4	8:48	879.7	831.7
5	8:49	161.2	113.2
6	8:50	103.2	55.2
7	8:51	1449.9	1401.9
8	8:52	576.3	528.3
9	8:53	598.3	550.3
10	8:54	577.5	529.5
11	8:55	584.2	536.2
12	8:56	603.8	555.8
13	8:57	608.1	560.1
14	8:58	603.2	555.2
15	8:59	626.4	578.4
16	9:00	639.2	591.2
17	9:01	644.1	596.1
18	9:02	643.5	595.5
19	9:03	645.3	597.3
20	9:04	653.2	605.2
21	9:05	652	604
22	9:06	652.6	604.6
23	9:07	647.1	599.1
24	9:08	641.6	593.6
25	9:09	646.5	598.5
26	9:10	637.4	589.4
27	9:11	638	590
28	9:12	641.6	593.6
29	9:13	633.1	585.1
30	9:14	622.7	574.7
31	9:15	627	579
32	9:16	623.3	575.3
33	9:17	625.8	577.8
34	9:18	630	582
35	9:19	622.7	574.7

36	9:20	622.7	574.7
37	9:21	639.8	591.8
38	9:22	630	582
39	9:23	625.2	577.2
40	9:24	634.9	586.9
41	9:25	629.4	581.4
42	9:26	632.5	584.5
43	9:27	632.5	584.5
44	9:28	628.8	580.8
45	9:29	644.1	596.1
46	9:30	644.1	596.1
47	9:31	641	593
48	9:32	641	593
49	9:33	640.4	592.4
50	9:34	630	582
51	9:35	633.7	585.7
52	9:36	651.4	603.4
53	9:37	649	601
54	9:38	641.6	593.6
55	9:39	639.2	591.2
56	9:40	645.3	597.3
57	9:41	651.4	603.4
58	9:42	643.5	595.5
59	9:43	667.9	619.9
60	9:44	667.9	619.9
61	9:45	661.2	613.2
62	9:46	653.8	605.8
63	9:47	658.7	610.7
64	9:48	707	659
65	9:49	702.7	654.7
66	9:50	685	637
67	9:51	782.7	734.7
68	9:52	747.9	699.9
69	9:53	713.1	665.1
70	9:54	672.8	624.8
71	9:55	637.4	589.4
72	9:56	599.5	551.5
73	9:57	591	543
74	9:58	576.3	528.3
75	9:59	582.4	534.4
76	10:00	631.3	583.3
77	10:01	579.4	531.4
78	10:02	456.7	408.7
79	10:03	446.9	398.9
80	10:04	454.8	406.8
81	10:05	450.5	402.5
82	10:06	453	405

83	10:07	446.3	398.3
84	10:08	456	408
85	10:09	482.9	434.9
86	10:10	509.8	461.8
87	10:11	1269.2	1221.2
88	10:12	1404.8	1356.8

Concentration of CO2 [ppm]



Jacob Turner
 Engr-115
 8-11 a.m.

10/21/2016

Input Parameters:

Measured Coutdoor:	448
Assumed Coutdoor:	400
Correction Factor:	-48

Calculations:

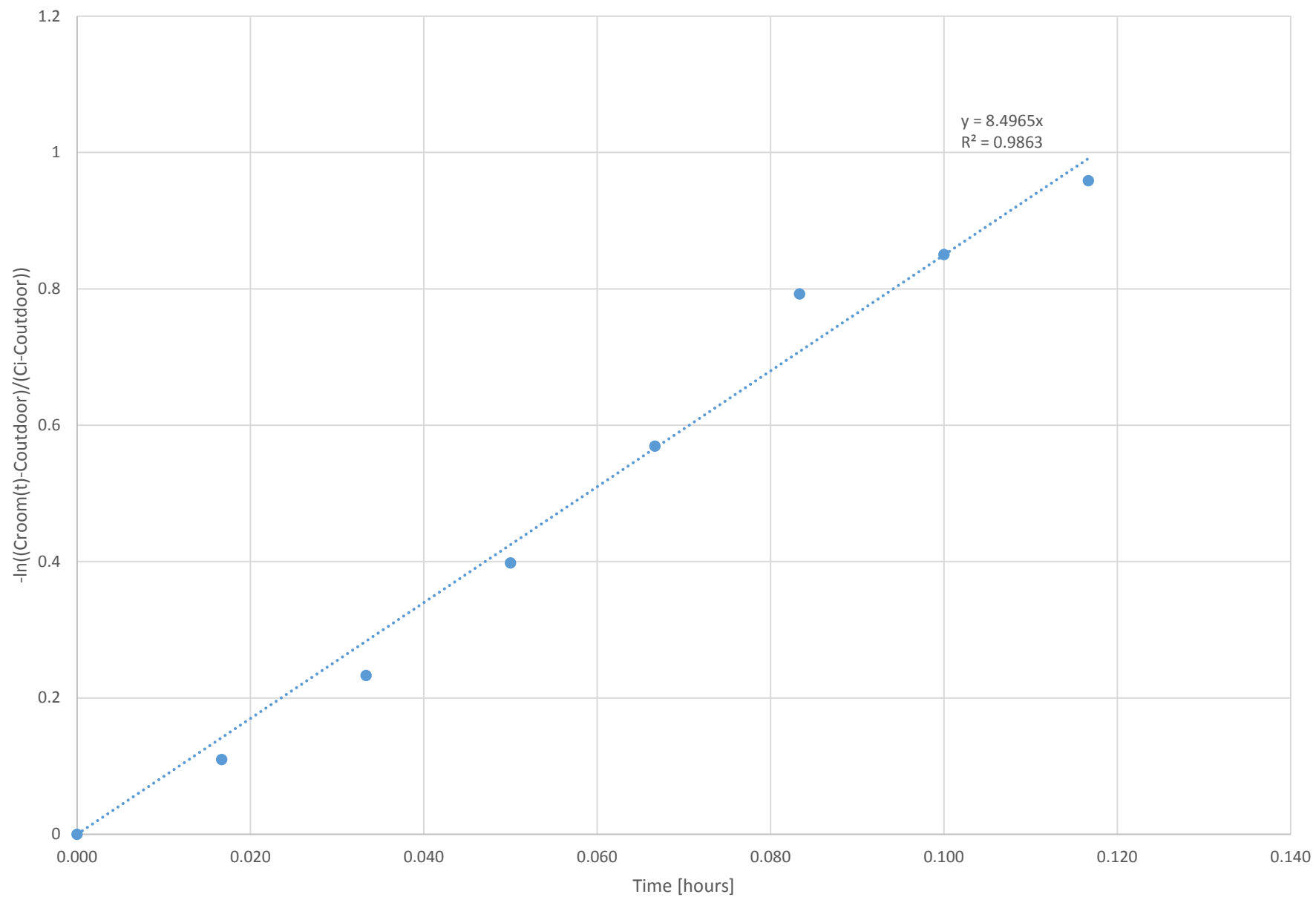
Room Volume (ft^3):	2990
Room Capacity:	28
Ventilation Rate:	15.12174702
λ	8.4965
Time to remove non-reactive chemical [hrs] :	0.118

Analysis:

Measurement	Date and Time	HOBO CO2 Concentration [ppm]
0	9:51	782.7
1	9:52	747.9
2	9:53	713.1
3	9:54	672.8
4	9:55	637.4
5	9:56	599.5
6	9:57	591
7	9:58	576.3

Actual CO2 Concentration [ppm]	Experiment Time [hr]	$-\ln((C_{room}(t)-C_{outdoor})/(C_i-C_{outdoor}))$
734.7	0.000	0
699.9	0.017	0.109785522
665.1	0.033	0.233127495
624.8	0.050	0.39802349
589.4	0.067	0.569373427
551.5	0.083	0.792648983
543	0.100	0.850389978
528.3	0.117	0.958863337

Air Exchange



1. What is the air exchange rate (λ) of the room you tested? Be sure to include the units for the air exchange rate in your answer.

2. In general it takes $3/\lambda$ hours to remove a non-reactive chemical from indoor air. Based on this time, what recommendations would you make to the occupants of the room?

3. Compare your ventilation rate for a typical number of occupants to the ASHRAE recommended ventilation rate. Based on this comparison, are the occupants wasting energy heating and cooling the air or are the occupants being too cheap and not supplying enough air? Justify your answer.

4. Given the ASHRAE standard ventilation standard, what is the maximum number of people you would recommend having in this room at one time? Use your model to determine this number.

1. The air exchange rate of our room is $\lambda=8.4965$ Exchanges/hour

2. Based on the air exchange rate I would recommend that if the occupants feel light headed they leave the room for 20 minutes for the CO₂ to clear, as in 20 minutes the room should be cleared of CO₂.

3. The occupants are wasting energy heating and cooling the air because the maximum occupancy based on the ASHRAE's recommended ventilation rate is 15 scfm/person and the room could safely (not practically) hold 28 people and still meet this recommendation.

4. 28 people could fit into the room based on ASHRAE's recommended ventilation rate of 15 scfm/person