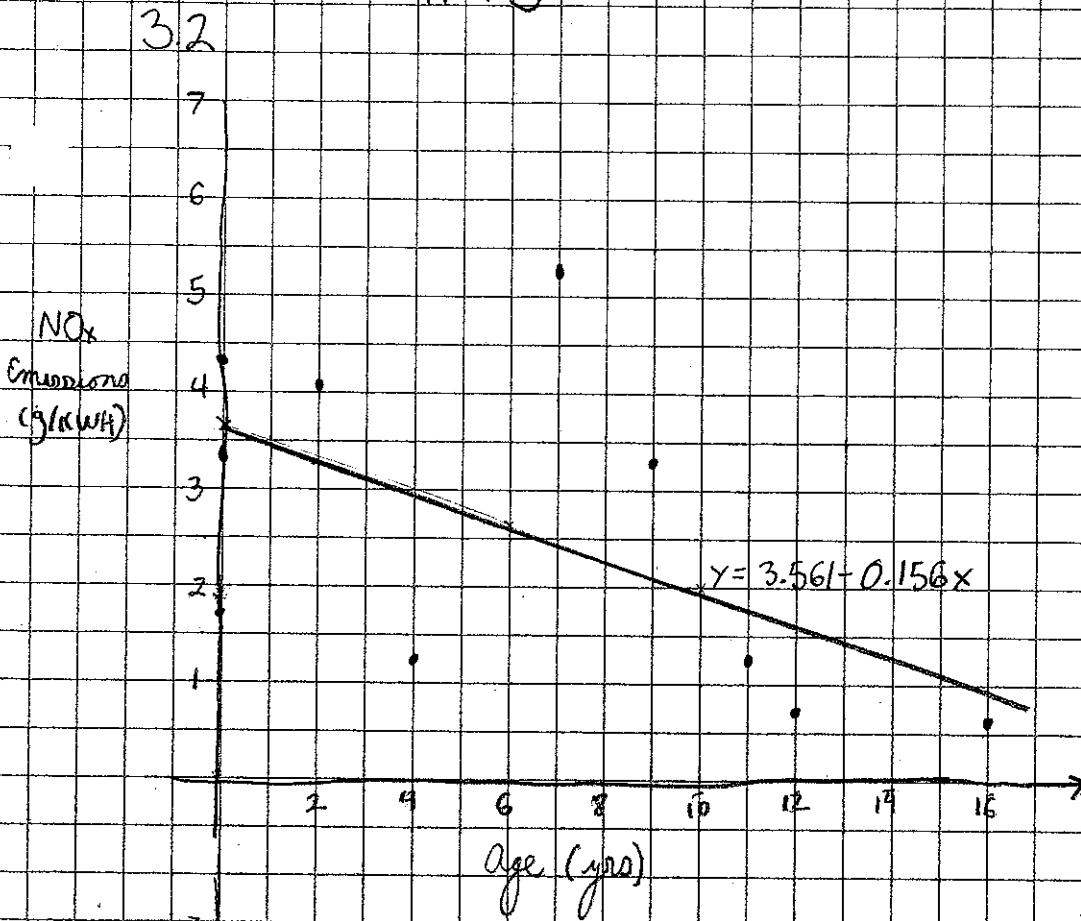
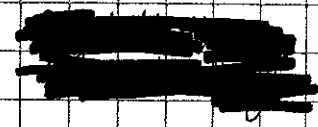


HW 3



Baseline:

$$b = \frac{\sum x_i y_i - (\sum x_i)(\sum y_i)/n}{\sum x_i^2 - (\sum x_i)^2/n}$$

$$= \frac{112.44 - (6 \cdot 26.09)/10}{671 - 61^2/10}$$

$$= -0.156$$

$$a = \bar{y} - b\bar{x}$$

$$= 2.609 + 0.156(6.1)$$

$$= 3.561$$

$$r = \frac{(\sum xy - \bar{x}\bar{y})}{\sqrt{(\sum x^2 - \bar{x}^2)(\sum y^2 - \bar{y}^2)}}$$

$$= \frac{21.294 - 6.1(2.609)}{\sqrt{(671 - 61^2)(9.401 - 2.609^2)}}$$

$$= \frac{5.329}{8.806} = 0.605 \quad [r^2 = 0.366]$$

Reformulated:

$$b = \frac{156.42 - 61 \cdot 3.523/10}{671 - 61^2/10}$$

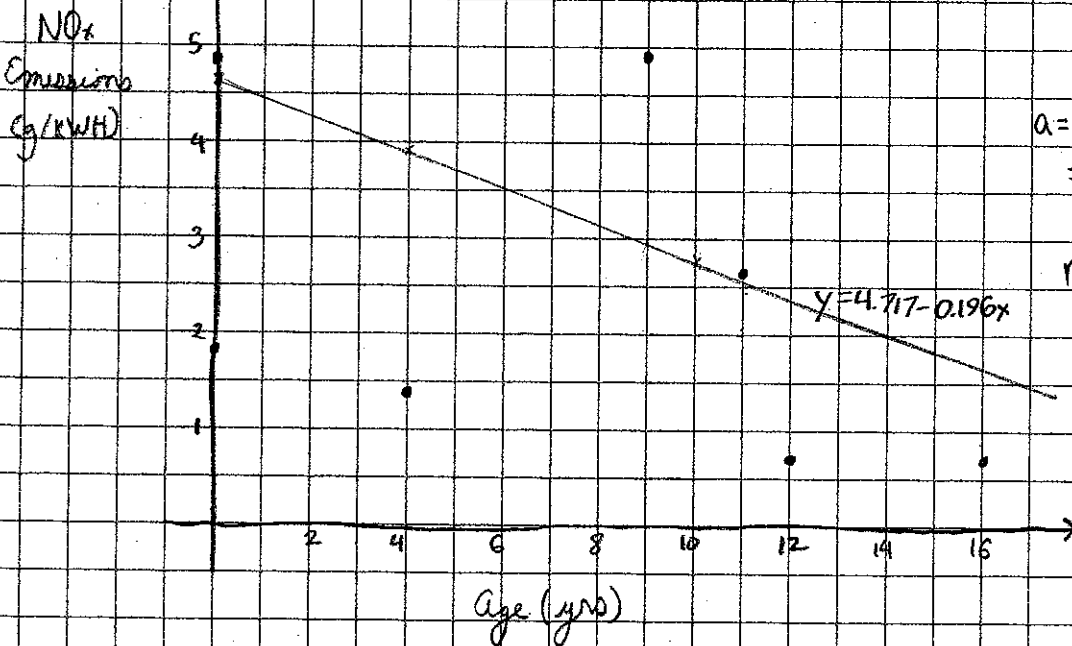
$$= -0.196$$

$$a = 3.523 + 0.196 \cdot 6.1$$

$$= 4.717$$

$$r = \frac{15.642 - 6.1(3.523)}{\sqrt{(671 - 61^2)(17.05 - 3.523^2)}}$$

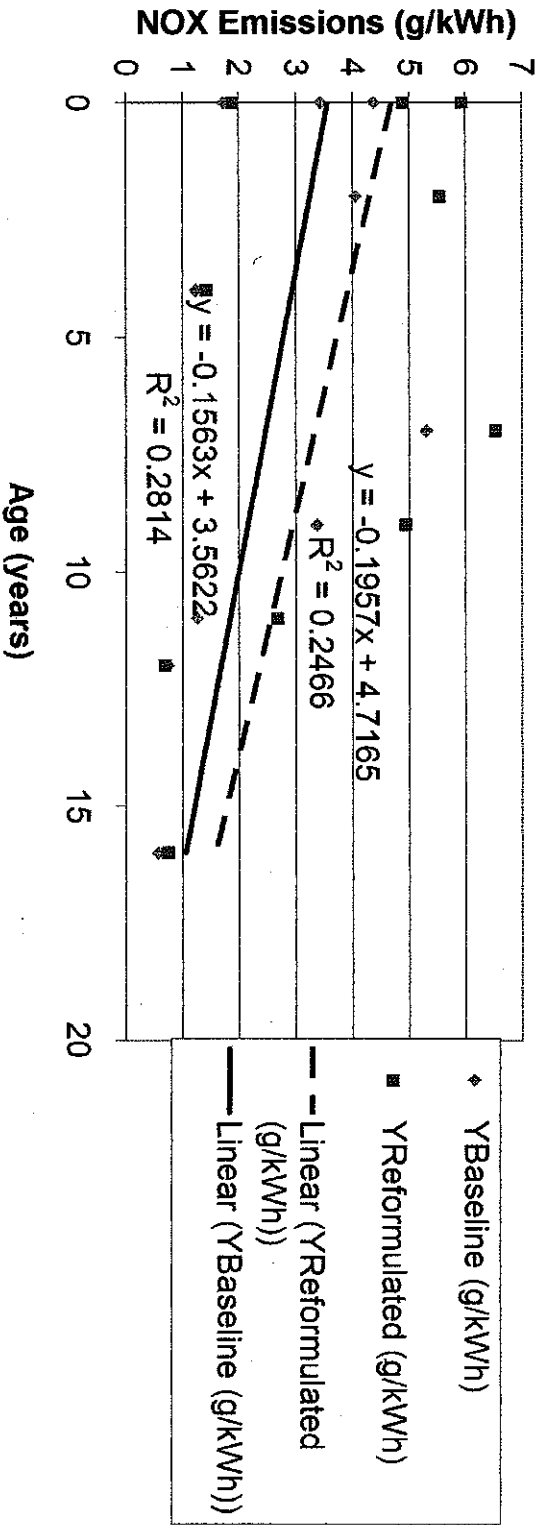
$$= -0.497 \quad [r^2 = 0.247]$$



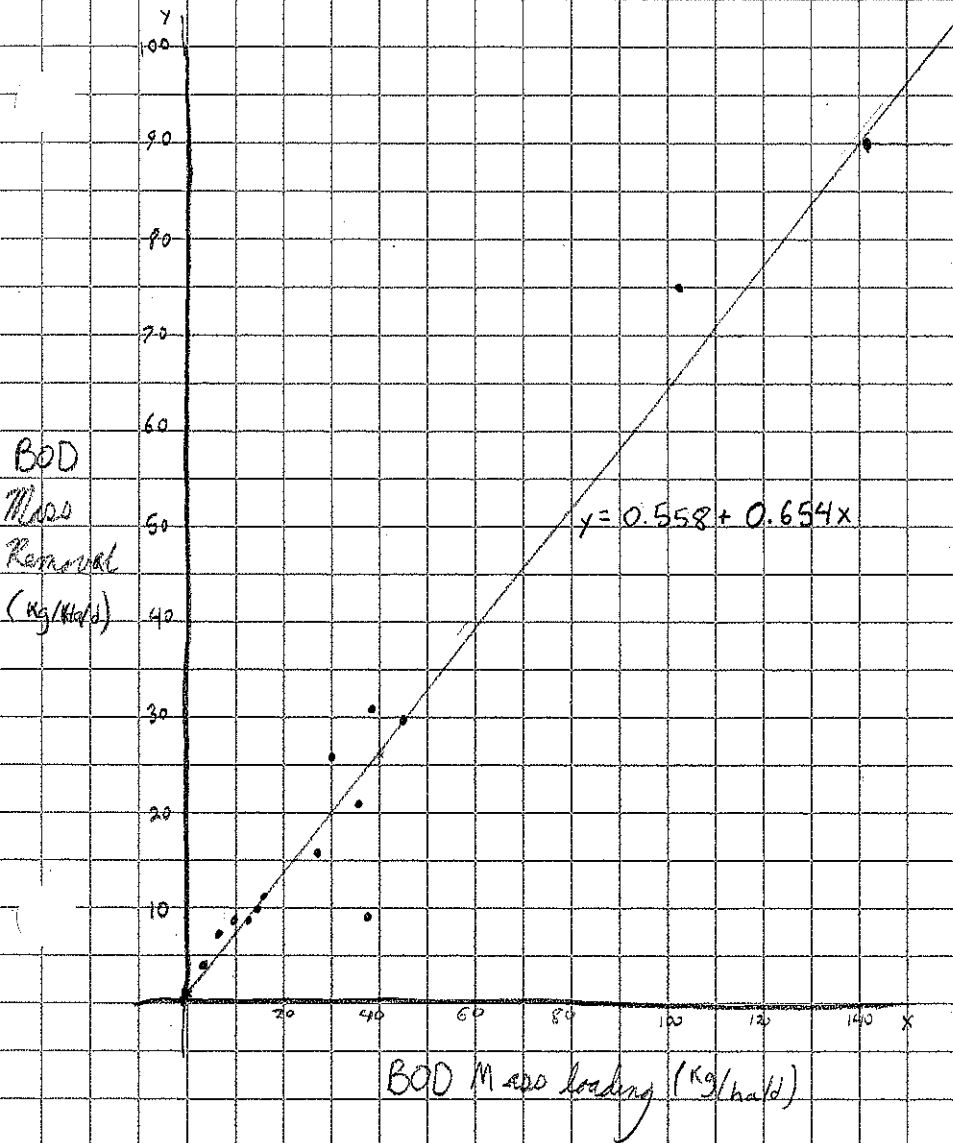
Both have a weak linear relationship between the variables with a negatively sloped trendline.

Engine	X (yrs)	X ²	Y ^{Baseline} (g/kWh)	Y ² _{Baseline}	X ^Y _{Baseline}	Y ^{Reformulated} (g/kWh)	Y ² _{Reformulated}	X ^Y _{Reformulated}
1	0	0	1.72	2.9584	0	1.88	3.5344	0
2	0	0	4.38	19.1844	0	5.93	35.1649	0
3	2	4	4.06	16.4836	8.12	5.54	30.6916	11.08
4	11	121	1.26	1.5876	13.86	2.67	7.1289	29.37
5	7	49	5.31	28.1961	37.17	6.53	42.6409	45.71
6	16	256	0.57	0.3249	9.12	0.74	0.5476	11.84
7	9	81	3.37	11.3569	30.33	4.94	24.4036	44.46
8	0	0	3.44	11.8336	0	4.89	23.9121	0
9	12	144	0.74	0.5476	8.88	0.69	0.4761	8.28
10	4	16	1.24	1.5376	4.96	1.42	2.0164	5.68
Total	61	671	26.09	94.0107	112.44	35.23	170.5165	156.42
Mean	6.1	67.1	2.609	9.40107	11.244	3.523	17.05165	15.642

Exhaust Emissions from Four-Stroke Lawn Mowers



346



$$b = \frac{25865 - (517 \cdot 346)/14}{39095 - 517^2/14}$$

$$= 0.654$$

$$a = 24.71 - 0.654 \cdot 36.93$$

$$= 0.558$$

$$r = \frac{1844.6 - 36.93 \cdot 24.71}{\sqrt{(2792.5 - 36.93^2)(1246.7 - 24.71^2)}}$$

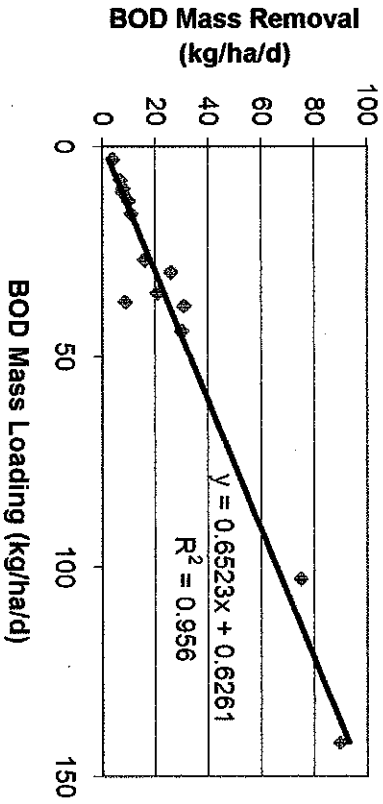
$$= 0.9778$$

$$r^2 = 0.956$$

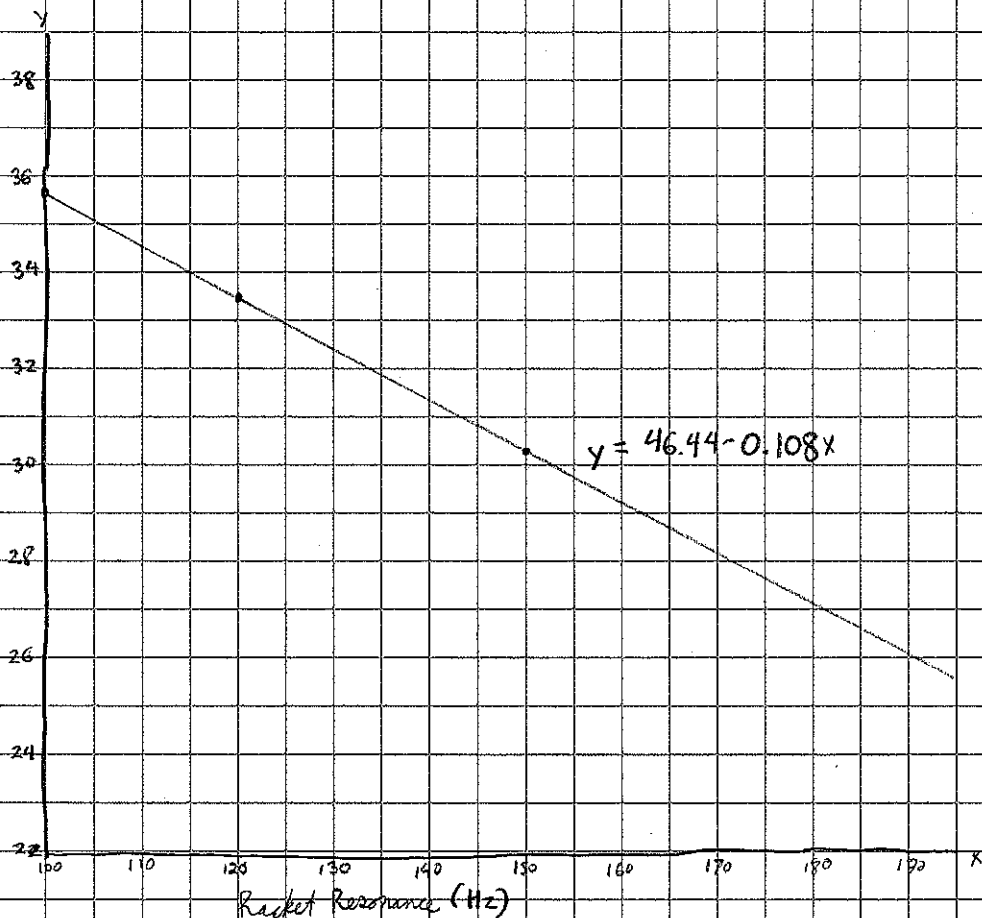
Strong positive linear relationship. Point at (37, 9) may skew line slightly.

	X	X ²	Y	Y ²	XY
1	3	9	4	16	12
2	8	64	7	49	56
3	10	100	8	64	80
4	11	121	8	64	88
5	13	169	10	100	130
6	16	256	11	121	176
7	27	729	16	256	432
8	30	900	26	676	780
9	35	1225	21	441	735
10	37	1369	9	81	333
11	38	1444	31	961	1178
12	44	1936	30	900	1320
13	103	10609	75	5625	7725
14	142	20164	90	8100	12780
Total	517	39095	346	17454	25825
Mean	36.92857	2792.5	24.71429	1246.714	1844.643

Capability of Subsurface Flow Wetland Systems



3.6



Scatterplot (shown in book)
has a moderate
negative linear relationship

$$b = \frac{93712.4 - (2879 \cdot 757.2/23)}{370235 - 2879^2/23}$$

$$= -0.108$$

$$a = 32.92 + 0.108 \cdot 125.17$$

$$= 46.44$$

$$r = \frac{4074.45 - 125.17 \cdot 32.92}{\sqrt{(16297.17 - 125.17^2)(1091.78 - 32.92^2)}}$$

$$= -0.793$$

58.79

$$r^2 = 0.628$$

3.6

	X	X ²	Y	Y ²	XY
1	105	11025	35.6	1267.36	3738
2	105	11025	34.8	1211.04	3654
3	109	11881	34.2	1169.64	3727.8
4	111	12321	31.8	1011.24	3529.8
5	111	12321	36.6	1339.56	4062.6
6	112	12544	36.7	1346.89	4110.4
7	113	12769	33.9	1149.21	3830.7
8	113	12769	34.3	1176.49	3875.9
9	114	12996	30.9	954.81	3522.6
10	114	12996	33.7	1135.69	3841.8
11	114	12996	34.4	1183.36	3921.6
12	120	14400	35.1	1232.01	4212
13	120	14400	33	1089	3960
14	121	14641	34.1	1162.81	4126.1
15	123	15129	32	1024	3936
16	125	15625	31.8	1011.24	3975
17	127	16129	36	1296	4572
18	135	18225	31.8	1011.24	4293
19	139	19321	32	1024	4448
20	140	19600	31.9	1017.61	4466
21	143	20449	30.2	912.04	4318.6
22	177	31329	23.7	561.69	4194.9
23	188	35344	28.7	823.69	5395.6
Total	2879	370235	757.2	25110.62	93712.4
Mean	125.1739	16097.17	32.92174	1091.766	4074.452

