

Section B

SAMPLE SITE	BUCK ROCK		BEAUMARIS	
	x	x^2	y	y^2
1	6.2	38.44	5.1	26.01
2	6.3	39.69	5.2	27.04
3	5.9	34.81	4.7	22.09
4	5.5	30.25	6.0	36.00
5	5.6	31.36	4.4	19.36
6	6.0	36	4.9	24.01
7	6.2	38.44	5.3	28.09
Σ	41.7	248.99	35.6	182.6
MEAN	$\bar{x}$ 5.957		$\bar{y}$ 5.08	

$$\text{VARIANCE} = \frac{\Sigma x^2 - \left(\frac{\Sigma x}{n}\right)^2}{n-1}$$

So	BUCK ROCK	BEAUMARIS
	$= \frac{248.99 - \left(\frac{41.7}{7}\right)^2}{6}$	$= \frac{182.6 - \left(\frac{35.6}{7}\right)^2}{6}$
	$= \frac{248.99 - 248.413}{6}$	$= \frac{182.6 - 181.051}{6}$
Var s^2	0.0962	0.258
SD	0.310	0.5079

VALUE of T

$$t = \frac{(\bar{x} - \bar{y})}{\sqrt{\frac{(n_x - 1)S^2_x + (n_y - 1)S^2_y}{(n_x + n_y - 2)}}} \times \frac{n_x + n_y}{n_x n_y}$$

$$= \frac{5.957 - 5.08}{\sqrt{\frac{(7-1) \times 0.0962 + (7-1) \times 0.258}{(7+7-2)}}} \times \frac{7+7}{7 \times 7}$$

$$= \frac{0.877}{\sqrt{\frac{0.5772 + 1.548}{12}}} \times \frac{14}{49}$$

$$= \frac{0.877}{\sqrt{0.1771 \times 0.2857}}$$

$$= \frac{0.877}{\sqrt{0.050597}}$$

$$= \frac{0.877}{0.2249377}$$

$$= 3.8988$$

$$Df = \frac{n-1}{2} = 6$$

Q2.

SITES	ENERGY USE PRE-LED	ENERGY USE WITH LED	Diff	RANK	SIGNED RANK
1	900	1456	+556	10	+10
2	945	1325	+380	5.5	+5.5
3	859	1266	+407	8	+8
4	879	999	+120	3	+3
5	620	1003	+383	7	+7
6	965	960	-5	1	-1
7	963	1025	+62	2	+2
8	403	826	+423	9	+9
9	856	1236	+380	5.5	+5.5
10	753	1009	+256	4	+4

$$T_+ = 54$$

$$T_- = 1$$

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4 / GOWER BEACHES

	VISITORS	RANK VISITORS	LOCALS	RANK LOCALS	DIFF	D ²	
1	LIMECLADE	1	2	4	5	3	9
2	FORT ERMON	7	2	3	6	4	16
3	LANGUNNITH	2	7	6	3	4	16
4	OXWICH	3	6	7	2	4	16
5	MENSCADE	5	4	1	8	4	16
6	LANGLAND	4	5	8	1	4	16
7	CASWELL	6	3	5	4	-1	1
8	SWANSEA BAY	8	1	2	7	-6	36

$\sum d^2 = 126$

$$rs = 1 - \frac{6 \sum d^2}{n^3 - n}$$

$$rs = 1 - \frac{756}{504}$$

$$= 1 - 1.5$$

$$= -0.5$$

Q5

MONITORING STATION	Km from STEELWORKS x	x^2	SO ₂ y mg/m^3	y^2	xy
1	1	1	2	4	2
2	2	4	4	16	8
3	4	16	4	16	16
4	8	64	6	36	48
5	10	100	7	49	70
6	13	169	8	64	104
7	12	144	7	49	84
Σ	50	498	38	234	332
$\bar{x}$	7.14		$\bar{y}$ 5.428		

$$b = \frac{\Sigma xy - \frac{\Sigma x \Sigma y}{n}}{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}$$

$$b = \frac{332 - \left(\frac{50 \times 38}{7}\right)}{498 - \left(\frac{50^2}{7}\right)}$$

$$= \frac{332 - 271.428}{498 - 357.142}$$

$$= \frac{60.572}{140.858}$$

$$b = 0.43$$

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

$$a = 5.428 - (0.43 \times 7.14)$$

$$= 2.357$$

$$\begin{aligned} 5 \text{ km} \quad y &= a + bx \\ &= 2.357 + (5 \times 0.43) \\ &= 4.507 \end{aligned}$$