

AGS 160MMAST 6

Ex. 382

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t (hr)	d (cm)
0	2
1	5
2	19
3	50
4	151
5	470
6	1435
7	4512
8	12936
9	41125
10	111021

$$d = \alpha \beta^t$$

$$\log d = \log (\alpha \beta^t)$$

$$\log d = \log \alpha + \log \beta^t$$

$$\log d = \log \alpha + t \log \beta$$

$$y = a_0 + a_1 x$$

$$y = \log d ; x = t$$

t (hr)	d (cm)	y = log d	xy	x <sup>2</sup>	y <sup>2</sup>
0	2	0.30103	0	0	0.090619
1	5	0.69897	0.69897	1	0.488559
2	19	1.2787536	2.557507	4	1.635211
3	50	1.69897	5.09691	9	2.886499
4	151	2.17897695	8.715908	16	4.747941
5	470	2.67209786	13.36049	25	7.140107
6	1435	3.1568519	18.94111	36	9.965714
7	4512	3.65436907	25.58058	49	13.35441
8	12936	4.11180001	32.89444	64	16.9069
9	41125	4.61410591	41.52695	81	21.28997
10	111021	5.04540513	50.45405	100	25.45611
55	171726	29.4113305	199.8269	385	103.962

R = 0.99945

R<sup>2</sup> = 0.9997

Excel

$$y = a_0 + a_1 x$$

$$\sum y = a_0 N + a_1 \sum x \quad \text{--- (1)}$$

$$\sum xy = a_0 \sum x + a_1 \sum x^2 \quad \text{--- (2)}$$

$$29.4113 \times 5 = 11a_0 + 55a_1 \quad \text{--- (1) } \times 5$$

$$199.8269 = 55a_0 + 385a_1 \quad \text{--- (2) } \times 1$$

$$29.4113$$

$$147.0565$$

$$29.4113 \times 5 = 55a_0 + 275a_1$$

$$199.8269 = 55a_0 + 385a_1$$

$$-52.7704 = -110a_1$$

$$a_1 = 0.4797$$

$$29.4113 = 11a_0 + 55(0.4797)$$

$$11a_0 = 29.4113 - 55(0.4797)$$

$$a_0 = \frac{29.4113 - 55(0.4797)}{11}$$

//

$$a_0 = 0.2725$$

$$y = a_0 + a_1 x$$

$$y = 0.2725 + 0.4797x$$

$$\log d = a_0$$

$$\log d = 0.2725$$

$$d = \underline{1.8728}$$

$$\log p = a_1$$

$$\log p = 0.4797$$

$$p = \underline{3.0179}$$

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

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

$$R = \frac{(11 \times 199.8269) - (55 \times 29.4113)}{\sqrt{(11 \times 385 - 55^2)(11 \times 103.9620485 - (29.4113)^2)}}$$

$$R = \frac{(11 \times 199.8269) - (55 \times 29.4113)}{\sqrt{(11 \times 385 - 55^2)(11 \times 103.9620485 - (29.4113)^2)}}$$

$$R = \underline{0.9998448}$$

$$R_{\text{square}} = \underline{0.9996896}$$

Excel =

$$R^2 = 0.9997$$

$$R = 0.999845$$

$$a_0 = 0.27511$$

$$a_1 = 0.479729$$