

MATHEMATICS ANSWERS

Level Three

Residuals

Obs	x	Residual v	v ²
1	266.304	-0.0035	0.0000123
2	266.318	0.0105	0.0001103
3	266.312	0.0045	0.0000203
4	266.304	-0.0035	0.0000123
5	266.313	0.0055	0.0000303
6	266.307	-0.0005	0.0000003
7	266.309	0.0015	0.0000023
8	266.303	-0.0045	0.0000203
9	266.301	-0.0065	0.0000423
10	266.305	-0.0025	0.0000063
11	266.302	-0.0055	0.0000303
12	266.310	0.0025	0.0000063
13	266.314	0.0065	0.0000423
14	266.307	-0.0005	0.0000003
15	266.303	-0.0045	0.0000203
Σ	3994.612	-0.0005	0.0003565

1.

- $\Sigma x = 3994.612$
- $\Sigma v = -0.0005$
- $\Sigma v^2 = 0.0003565$
- Mean = 266.3075

$$e. \text{ Standard error, SE} = \sqrt{\frac{\sum v_i^2}{(n-1)}} = 0.00505$$

- Standard error of the mean = $\frac{SE}{\sqrt{n}} = 0.0013$
- Probable error (i.e. at 50%) = 0.6745 SE = 0.0034

It is expected that half the observations lie between 266.308 ± 0.003 (i.e. from 266.305 – 266.311) In fact only a third fall into this category.

- 90% confidence interval = $1.6449SE = 0.0083$
Therefore we would expect 90% of our observations to fall between 266.308 ± 0.0083 which is from 266.300 – 266.316. This covers 14/15 results, which is 93%.
- 95% confidence interval level = $1.9599SE = 0.0099$
Therefore we would expect 95% of our observations to fall between 266.308 ± 0.0099 which is from 266.298 – 266.318. This covers all results.

2. Flying Height = $0.153 \times 20000 = 3060$ m