

Lampiran 21**Data Nilai Tes Keterampilan Proses Sains Kelas Eksperimen**

No.	Kode Siswa	Nilai	No.	Kode Siswa	Nilai
1	P	89	20	M	73
2	X	88	21	Z	73
3	C	86	22	AI	73
4	G	81	23	N	72
5	T	81	24	V	72
6	AL	81	25	R	70
7	K	80	26	AA	67
8	AK	80	27	Q	67
9	E	78	28	AB	67
10	AE	78	29	AG	67
11	AJ	77	30	B	66
12	D	75	31	U	64
13	F	75	32	AC	64
14	H	75	33	AF	63
15	I	75	34	J	59
16	O	75	35	S	59
17	Y	75	36	L	55
18	AD	75	37	W	48
19	A	73	38	AH	48

Rentang = data terbesar-data terkecil = $89-48 = 41$

Jumlah Kelas Interval (K) = $1+3,3 \log n = 1+3,3 \log 38 = 6,213 \approx 6$

Panjang Kelas (P) = rentang : jumlah kelas interval = $6,682 \approx 7$

No	Interval	f_i	x_i	$f_i \cdot x_i$	$x_i - \bar{x}$	$(x_i - \bar{x})^2$	$f_i (x_i - \bar{x})^2$
1	48-54	2	51	102	-19,895	395,811	791,622
2	55-61	3	58	174	-12,895	166,281	498,843
3	62-68	8	65	520	-5,895	34,751	278,008
4	69-75	14	72	1008	1,105	1,221	17,094
5	76-82	8	79	632	8,105	65,691	525,528
6	83-89	3	86	258	15,105	228,161	684,483
Σ		38	411	2694	-14,37	891,916	2795,579

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i} = \frac{2694}{38} = 70,895$$

$$\text{Standar deviasi (s)} = \sqrt{\frac{\sum f_i (x_i - \bar{x})^2}{(n-1)}} = \sqrt{\frac{2795,579}{(38-1)}} = 8,692$$

$$\text{varians sampel} = s^2 = 8,692^2 = 75,556$$

Data Nilai Tes Keterampilan Proses Sains Kelas Kontrol

No.	Kode Siswa	Nilai	No.	Kode Siswa	Nilai
1	R	86	20	AB	64
2	AD	81	21	D	63
3	B	78	22	AA	61
4	I	78	23	J	58
5	W	78	24	AC	58
6	AF	77	25	H	56
7	G	75	26	N	56
8	L	75	27	O	55
9	AE	73	28	AI	55
10	Q	72	29	AK	55
11	C	70	30	V	52
12	E	70	31	A	48
13	S	69	32	M	48
14	F	67	33	Y	48
15	P	67	34	Z	48
16	T	67	35	AG	47
17	AH	67	36	U	45
18	K	66	37	AL	45
19	AJ	66	38	X	39

Rentang = data terbesar-data terkecil = $86-39 = 47$

Jumlah Kelas Interval (K) = $1+3,3 \log n = 1+3,3 \log 36 = 6,213 \approx 6$

Panjang Kelas (P) = rentang : jumlah kelas interval = $7,564 \approx 8$

No	Interval	f_i	x_i	$f_i \cdot x_i$	$x_i - \bar{x}$	$(x_i - \bar{x})^2$	$f_i (x_i - \bar{x})^2$
1	39-46	3	42,5	127,5	-20,421	417,017	1251,052
2	47-54	6	50,5	303	-12,421	154,281	925,687
3	55-62	8	58,5	468	-4,421	19,545	156,362
4	63-70	11	66,5	731,5	3,579	12,809	140,902
5	71-78	8	74,5	596	11,579	134,073	1072,586
6	79-86	2	82,5	165	19,579	383,337	766,674
Σ		38	375	2391		1121,063	4313,263

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i} = \frac{2391}{38} = 62,921$$

$$\text{Standar deviasi (s)} = \sqrt{\frac{\sum f_i (x_i - \bar{x})^2}{(n-1)}} = \sqrt{\frac{4313,263}{(38-1)}} = 10,797$$

$$\text{varians sampel} = s^2 = 10,797^2 = 116,575$$

Lampiran 22

Uji Normalitas

Kelas Eksperimen

Rentang = data terbesar-data terkecil = 89-48 = 41

Jumlah Kelas Interval (K) = 6

Panjang Kelas (P) = rentang : jumlah kelas interval = 6,833 \approx 7

Interval	f_o	f_h	f_o-f_h	$(f_o-f_h)^2$	$\frac{(f_o-f_h)^2}{f_h}$
48-54	2	1	1	1	1
55-61	3	5	-2	4	0,800
62-68	8	13	-5	25	1,923
69-75	14	13	1	1	0,077
76-82	8	5	3	9	1,800
83-89	3	1	2	4	4
Σ	38	38	0	44	9,600
χ tabel, dk = 5				= 11,070	
Status				berdistribusi normal	

Kelas Kontrol

Rentang = data terbesar-data terkecil = 86-39 = 47

Jumlah Kelas Interval (K) = 6

Panjang Kelas (P) = rentang : jumlah kelas interval = 7,833 \approx 8

Interval	f_o	f_h	f_o-f_h	$(f_o-f_h)^2$	$\frac{(f_o-f_h)^2}{f_h}$
39-46	3	1	2	4	4
47-54	6	5	1	1	0,200
55-62	8	13	-5	25	1,923
63-70	11	13	-2	4	0,308
71-78	8	5	3	9	1,800
79-86	2	1	1	1	1
Σ	38	38	0	44	9,231
χ tabel, dk = 5				= 11,070	
Status				berdistribusi normal	

Dimana: $\chi^2 = \sum_{i=1}^k \frac{(f_0 - f_h)^2}{f_h}$ keterangan $\chi^2 =$ Normalitas Chi Kuadrat

f_0 = frekuensi yang diamati

f_h = frekuensi yang diharapkan

Lampiran 23

Uji Homogenitas dan Hipotesis

Uji Homogenitas

Kelas	\bar{x}	$\sum f_i (x_i - \bar{x})^2$	(n-1)	S	S ²
Eksperimen	70,895	2795,579	37	8,692	75,556
Kontrol	62,921	4313,263	37	10,797	116,575

$$F_{\text{hitung}} = \frac{\text{varians terbesar}}{\text{varians terkecil}} = \frac{s^2_{\text{kontrol}}}{s^2_{\text{eksperimen}}} = \frac{116,575}{75,556} = 1,54$$

$F_{\text{tabel}} (\alpha = 0,05)$ dk pembilang (37) ada diantara dk (30) = 1,78 dan dk (40) = 1,72

$$\text{maka } dk(37) = 1,78 + \frac{37 - 30}{40 - 30} \times (1,78 - 1,72) = 1,822$$

$F_{\text{tabel}} (\alpha = 0,05)$ dk penyebut (37) ada diantara dk (36) = 1,78 dan dk (38) = 1,76

$$\text{maka } dk(37) = 1,78 + \frac{37 - 36}{38 - 36} \times (1,78 - 1,76) = 1,79$$

Jadi $F_{\text{tabel}} (\alpha = 0,05, dk_{\text{pembilang}} = dk_{\text{penyebut}} = 37)$	1,79
Perbandingan	$F_{\text{hitung}} \leq F_{\text{tabel}} = 1,54 \leq 1,79$
Status	Homogen

Uji Hipotesis

Kelas	\bar{x}	S	S ²	α	n	dk (n1+n2-2)	t _{hitung}	t _{tabel}
Eksperimen	70,895	8,692	75,556	0,05	38	74	3,55	2,2
Kontrol	62,921	10,797	116,575	0,05	38			

$$t_{hitung} = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{70,895 - 62,921}{\sqrt{\frac{75,556}{38} + \frac{116,575}{38}}} = 3,55$$

t_{tabel} ($\alpha = 0,05$, $dk = n_1 + n_2 - 2 = 74$) ada diantara $dk (60) = 2$ dan $dk (120) = 1,98$

$$\text{Jadi } t_{tabel} (\alpha = 0,05, dk = 74) = 2 + \frac{74-60}{120-60} \times (2 - 1,98) = 2,2$$

Perbandingan: $t_{hitung} > t_{tabel} = 3,55 > 2,2$

Status : H_0 ditolak dan H_1 diterima

Keterangan :

n_1 : jumlah siswa kelas eksperimen

n_2 : jumlah siswa kelas kontrol

\bar{x}_1 : Rata-rata sampel kelas eksperimen.

\bar{x}_2 : Rata-rata sampel kelas kontrol.

s_1^2 : Varians sampel kelas eksperimen.

s_2^2 : Varians sampel kelas kontrol.