

Two Sample test:-
 (7.) null Hypothesis: $H_0: \mu_1 = \mu_2$
 Alternative Hypothesis: $H_a: \mu_1 \neq \mu_2$

children	$(x_1 - \bar{x}_1)$	$(x_1 - \bar{x}_1)^2$	adult	$(x_2 - \bar{x}_2)$	$(x_2 - \bar{x}_2)^2$
(x_1)	$(x_1 - 44.61)$		(x_2)	$(x_2 - 10.1689)$	
40.3	-4.3789	19.17472	20.0	9.83103	96.64915
55.0	10.3211	106.5252	30.2	20.03103	401.2422
45.7	1.021105	1.042655	2.2	-7.96897	63.50448
43.3	-1.3789	1.901351	7.5	-2.66897	7.123401
50.3	5.621105	31.59682	4.4	-5.76897	33.28101
45.9	1.221105	1.491097	22.2	12.03103	144.7457
53.5	8.821105	77.81189	16.6	6.43103	41.35815
43.0	-1.6789	2.818688	14.5	4.33103	18.75782
44.2	-0.47889	0.22934	21.4	11.23103	126.136
44.0	-0.67889	0.460898	3.3	-6.86897	47.18275
33.6	-11.0789	122.7419	10.0	-0.16897	0.028551
55.1	10.42111	108.5994	1.0	-9.16897	84.07001
48.8	4.121105	16.98351	4.4	-5.76897	33.28101
50.4	5.721105	32.73104	1.3	-8.86897	78.65863
37.8	-6.8789	47.3192	8.1	-2.06897	4.280637
60.3	15.62111	244.0189	6.6	-3.56897	12.73755
46.6	1.921105	3.690644	7.8	-2.36897	5.612019
47.4	2.721105	7.404412	10.6	0.43103	0.185787
44.0	-0.67889	0.460898	10.6	0.43103	0.185787
			16.2	6.03103	36.37332
848.9		627.0026	14.5	4.33103	18.75782
			4.1	-6.06897	36.8324
			15.8	5.63103	31.7085
			4.1	-6.06897	36.8324
			15.8		
			2.4	-7.76897	60.3589
			3.5	-6.66897	44.47516

8.5	-1.66897	2.785461
4.7	-5.46897	60.35689
18.2	8.23103	31.7085
<u>294.68</u>		<u>36.8299063</u>
		<u>1565.893</u>

$$\rightarrow \bar{x}_1 = \frac{\sum x_1}{n_1}$$

$$= \frac{848.9}{19}$$

$$\boxed{\bar{x}_1 = 44.67895}$$

$$\rightarrow \bar{x}_2 = \frac{\sum x_2}{n_2}$$

$$= \frac{294.8}{29}$$

$$\boxed{\bar{x}_2 = 10.16897}$$

$$\rightarrow S.D. (SD) = \sqrt{\frac{\sum (x_1 - \bar{x}_1)^2 + \sum (x_2 - \bar{x}_2)^2}{n_1 + n_2 - 2}}$$

$$= \sqrt{\frac{827.0026 + 1565.893}{19 + 29 - 2}}$$

$$= \sqrt{\frac{2392.895}{46}}$$

$$\boxed{S = 7.2125}$$

$$\rightarrow t = \frac{\bar{x}_1 - \bar{x}_2}{S} \times \sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

$$= \frac{44.67895 - 10.16897}{7.2125} \times \sqrt{\frac{19 \times 29}{19 + 29}}$$

$$= \frac{34.50998}{7.2125} \times \sqrt{\frac{551}{48}}$$

$$= 4.7847 \times 3.3881$$

$$\boxed{t_{\text{calc}} = 16.2110}$$

$$\rightarrow \text{degree of freedom} = n_1 + n_2 - 2$$

$$= 19 + 29 - 2$$

$$= 46$$

$$\rightarrow \text{level of significant } (\alpha) = 0.05$$

$$\rightarrow \text{confidence level} = 95\%$$

$$\rightarrow \text{null Hypothesis: } H_0: \mu_1 = \mu_2$$

$$\text{Alternate Hypothesis: } H_a: \mu_1 \neq \mu_2$$

[Two-tail test]

$$\rightarrow \text{look in to } t\text{-table where } d.f = 46 \text{ \& } \alpha = 0.05$$

* P-value & statistical significance:

The two-tailed p-value is less than 0.0001

$$* \text{Confidence level} = 95\% \quad 34.50998$$

$$\mu = \text{Group-1} - \text{Group-2} = 36.631$$

95% confidence interval of this difference:

From 32.424 to 40.838

$$t_{\text{score}} = 16.210$$

$$d.f = 46$$

$$\text{standard error of difference} = 2.098$$

$$p\text{-value} = 0.0001$$

$$\text{So, } p\text{-value} < \alpha$$

We can reject the null hypothesis

$$\rightarrow p\text{-value} = 0.0001$$

$$p\text{-value } (0.0001) < \alpha (0.05)$$

So, we will reject the null hypothesis.