- **Question:** Does the type of phosphorescent coating affect length of time an airplane instrument dial glows?
- **Study:** 24 airplane instrument dials are randomly divided into three groups of 8. Within each group the dials are painted with a particular type of phosphorescent coating. Each dial was exposed to a strong light source for a specified amount of time. Once the light is turned off the amount of time the dial glowed was recorded.
- **Data:** Glow time in minutes.

Type 1	Rank	Type 2	Rank	Type 3	Rank
50.0	1	54.7	4	63.4	16
52.9	2	55.0	5	64.6	17
53.1	3	58.4	7	65.6	19
57.4	6	58.5	8	66.6	20
59.3	9	59.8	10	67.3	21
60.8	12	59.9	11	71.3	22
61.2	13	62.5	15	72.9	23
62.1	14	64.7	18	74.8	24
$R_1=$	60	$R_2=$	78	$R_3=$	162
$\overline{R}_1=$	7.50	$\overline{R}_2=$	9.75	$\overline{R}_3=$	20.25

- **Kruskal-Wallis statistic:**

$$\begin{aligned} H &= \frac{12}{N(N+1)} \sum \frac{R_j^2}{n_j} - 3(N+1) \\ &= \frac{12}{24(25)} \left[\frac{(60)^2}{8} + \frac{(78)^2}{8} + \frac{(162)^2}{8} \right] - 3(25) \\ &= \frac{12}{24(25)} [4491] - 75 = 89.82 - 75 = 14.82 \end{aligned}$$

- **Critical value; experimentwise error rate of 0.06**

$$2.33 \sqrt{\frac{24(25)}{12} \left(\frac{1}{8} + \frac{1}{8} \right)} = 8.24$$

Comparison	Difference in Average Ranks	Significant?
Type 1 & Type 2	2.25	No
Type 1 & Type 3	12.75	Yes
Type 2 & Type 3	10.50	Yes

Type 3 is significantly different from both Types 1 & 2 in terms of glow time.