

A Simple Comparative Experiment with Paper Clips

Stat-Ease, Inc. uses millions of paper clips per year. The vice-president in charge of office supplies believes that big clips, although initially more costly, would save money over the long run due to their superior strength.

Test Procedure:

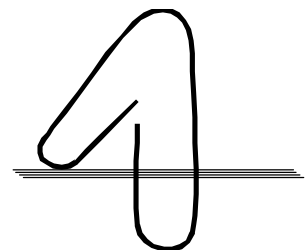
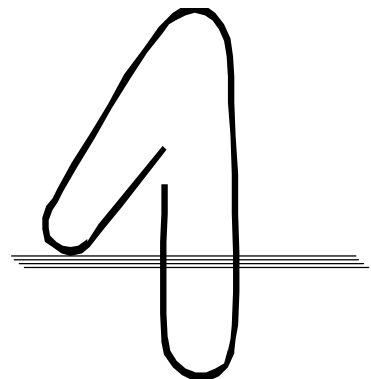
1. Obtain one big and one little clip from the instructor. Flip a coin to randomly choose the first clip to break: Heads-big or Tails-little.

2. Gently pull your clips apart with the big loop on the right. Use the pictures as a template. The angle affects performance, so be precise.

3. Move the clip to the bottom of this page or the facing page, whichever is the thicker side, and bring the smaller loop to the edge as pictured.

4. Hold the small loop down firmly with your left thumb. Grasp the big loop between right thumb and forefinger. Then bend the big loop straight up and back. Continue bending the big loop back and forth until it breaks. Record the count for each clip. (Each back and forth movement counts as 2 bends.)

5. The instructor will tabulate the results from the entire class. You must do a statistical analysis of this data.



Paper Clip Experiment

Student	Little	Big
n = 1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
mean	__.'__	__.'__
std dev	__.'__	__.'__

Paper Clip Experiment

t-Test (use $\alpha = 0.05$)

$$\bar{Y}_L = \underline{\hspace{2cm}} \quad s_L = \underline{\hspace{2cm}}$$

$$\bar{Y}_B = \underline{\hspace{2cm}} \quad s_B = \underline{\hspace{2cm}}$$

$$s_{\text{pooled}} = \sqrt{\frac{(s_L^2 + s_B^2)}{2}} = \sqrt{\frac{\underline{\hspace{1cm}}^2 + \underline{\hspace{1cm}}^2}{2}} = \underline{\hspace{2cm}}$$

$$s_{\bar{Y}_L - \bar{Y}_B} = s_{\text{pooled}} \sqrt{\frac{1}{n} + \frac{1}{n}} = s_{\text{pooled}} \sqrt{\frac{2}{\underline{\hspace{1cm}}}} = \underline{\hspace{2cm}}$$

$$t = \frac{\bar{Y}_L - \bar{Y}_B}{s_{\bar{Y}_L - \bar{Y}_B}} = \frac{\underline{\hspace{1cm}} - \underline{\hspace{1cm}}}{\underline{\hspace{1cm}}} = \underline{\hspace{2cm}}$$

$$t_{\alpha=0.05/2, df=2(n-1)} = \underline{\hspace{2cm}}$$